IMPERIAL BUREAU OF ANIMAL HEALTH

THE
VETERINARY BULLETIN

Vol. 2.] **November, 1932.** [No. 11.

DISEASES CAUSED BY BACTERIA AND FUNGI.

IDZERDA, J., & VAN EVERDINGEN, W. A. G. (1932). Zur Kenntnis der Aenderungen die in Blutnährböden durch Streptokokken, Typus α (Brown) verursacht werden. I. Mitteilung. II. Ueber die Wirkung von sterilen Agarfiltraten auf kleine Erythrozytenmengen. [**On the Alterations produced in Blood Media by Streptococci of α Type (Brown). Part I. Part II. On the Action of Sterile Agar Filtrates on Small Amounts of Erythrocytes**]. —*Zlb. Bakt. I.* (*Orig.*). **123.** 401-414, and **124.** 78-89. 2 plates, 4 tables, 1 chart. [13 refs.]

I. After a discussion of the subject in general the authors describe their own experiments, giving full details of the media and methods used, which included the cutting of sections and the use of stereoscopic observation, the value of both of which is emphasized. Twenty-four photographs are given. Stress is laid on the effect of pH and on the fact that the changes in blood agar plates occur equally in three dimensions, except in so far as they are affected by the position of the colony relative to the surface. Parallelism was not found between the number of zones and the number of changes of temperature from that of the incubator to that of the cold room. The cells left immediately around the colony were found to be absolutely resistant to saponin, hypotony and crystals of sodium chloride whilst those felt in the secondary zones of discolouration were less resistant than those of the unaltered part of the plate. By the use of twin tubes (Asheshow) separated by a suitable membrane, it was shown that the growth products of an α strain rendered the red cells less resistant than normal and similar to those of the outer zone described above.

II. From the action of various volumes of filtrates from agar in which α streptococci had been grown, on various numbers of erythrocytes ($0{\cdot}4 \times 10^6$ to 48×10^6), it is concluded that, provided that small numbers of cells are used, changes can be produced which are similar to those in plates and which render the cells similarly susceptible to the influence of pH and temperature. It is believed that the process is the same in both cases and due to an excretion of the streptococcus. This will be considered in a later report.

A. W. STABLEFORTH.

WILKINSON, E. (1931). **Milk-Borne Streptococcal Infections.**—*Brit. Med. J.* Sept. 12th. 494-496. [2 refs.]

Two outbreaks are contrasted, both due to haemolytic streptococci. The first, which was one of scarlet fever, lasted only a few days and the attacks,

numbered by tens and with two deaths, were almost limited to persons served by one roundsman, himself a carrier of infection. The second, an epidemic of sore throat (not notifiable) was spread over about a month during which members of over 1,000 families were affected and 65 deaths occurred. The patients received their milk from many roundsmen belonging to a large collecting dairy, none of whom, so far as is known, was infected. In contrast to the scarlet fever epidemic in which direct infection by the roundsman was probably causal, the extent and widespread nature of the sore throat epidemic points to some gross infection of the milk such as could be accounted for by an actual infection of the cow with organisms derived from a human source. This outbreak ceased when the milk from a certain farm was excluded : the milk contained haemolytic streptococci, but their exact nature was not ascertained.

Some time later, a bacteriological examination was obtained of milk from each quarter of every cow, but, although haemolytic streptococci were obtained from many cows, all proved to be of bovine type. It is pointed out that during the period which elapsed between the outbreak and the examination many cows had been removed and that, in any case, a previous infection might have disappeared.

A. W. STABLEFORTH.

EDWARDS, S. J. (1932). **Studies on Bovine Mastitis. VI. The Non-Haemolytic Streptococci of Bovine Mastitis and their Relationship to Certain Saprophytic Streptococci from Cattle.**—*J. Comp. Path. & Therap.* **45.** 43-57. 2 tables. [23 refs.]

This paper deals with the examination of 107 strains of non-haemolytic streptococci isolated from the same number of milk samples by plating in 5 per cent. ox blood agar. By cultural and biochemical tests the strains could be arranged in four groups of which the main characters of differential value were the following :—

GROUP I, 25 STRAINS.—Long chains of transversely elongated cocci in broth ; acid and firm clot in litmus milk ; no reduction of methylene blue milk (1 : 20,000) ; final pH of 4·4 to 4·7 in glucose broth ; fermentation of salicin and not of mannite, inulin, or raffinose ; hydrolysis of sodium hippurate. These are the characters of the group referred to as *Streptococcus agalactiae*.

GROUP II, 22 STRAINS.—Short to medium chains of small rounded cocci in broth ; acid, or acid with clot and partial reduction in litmus milk ; reduction of methylene blue milk ; final pH of 5·0 to 5·3 in glucose broth ; no fermentation of salicin, mannite, inulin, or raffinose ; no hydrolysis of hippurate.

GROUP III, 33 STRAINS.—Short chains of small round cocci in broth ; acid, or acid with clot and partial reduction in litmus milk at 37° C. ; slight growth in milk at 10° C. ; final pH of 4·5 to 4·8 in glucose broth ; fermentation of salicin, mannite and inulin but not raffinose ; hydrolysis of hippurate.

GROUP IV, 27 STRAINS.—Abundant flocculent deposit in broth, composed of extremely long chains of elongated cocci ; fermentation of inulin and raffinose by more than half the strains. In their fermentation characters these strains fall into the group of bovine faecal streptococci, to which the name *Str. bovis* has been assigned.

The changes produced by Group II and Group III strains in litmus milk during five days' incubation at 37° C. were found to depend on the amount of culture used for inoculation. Large amounts brought about coagulation and reduction of the medium, whereas smaller amounts caused acidification only.

The relationship of the four groups to bovine mastitis is discussed. Most of the Group I strains were isolated from the milk samples of cows with chronic catarrhal mastitis, the form of disease with which *Str. agalactiae* is now well recognized to be associated, and one of these strains set up similar changes when injected into the udder of a lactating cow. Group II strains were isolated from more acute cases of mastitis discussed by MINETT, STABLEFORTH and EDWARDS [(1932). *J. Comp. Path. & Therap.* **45.** 1]. A number of these strains were found to be pathogenic for mice, rabbits and goats, and two strains on intra-mammary injection in cows led to acute changes with permanent damage and followed by early drying. Group III strains were cultivated from milk showing definite abnormality, though in the majority of cases the changes were slight. Cultures of two strains, injected into normal udders of cows, caused mastitis which in one case was acute and in the other chronic. Group IV strains were non-pathogenic and there is no evidence of their association with mastitis.

The mastitis Groups I, II and III could be distinguished from certain saprophytic streptococci which might gain access to milk from such sources as cow's skin and faeces, e.g. *Str. lactis*, *Str. acidominimus*, *Str. kefir*, *Str. bovis* and *Str. viridans bovis*. Among the differential points of value in the case of *Str. lactis* were its morphology, growth in litmus milk at 10° C., resistance to heat, at 60° C., reduction of janus green and fermentation of aesculin in a medium containing 0·25 per cent. sodium taurocholate. Positive results with the aesculin test were found to be primarily due to organisms tolerating bile salt.

S. J. EDWARDS.

SHOLL, L. B., & TORREY, J. P. (1931). **A Contribution to the Bacteriology and Pathology of the Bovine Udder.**—*Michigan State Tech. Bull.* No. 110. 1-31. 5 plates, 14 pages of tables. [6 refs.]

Since 1924 the authors have studied the mammary glands of 92 cows particularly from the viewpoint of brucella infection. The breeding records, age, and some details regarding lactation are given, together with the results of bacteriological and histological studies in 14 pages of tables. An examination was made of the colostrum from each animal and of a sample of milk taken about one week later. If *Br. abortus* was found, repeated examinations were made ; if no organisms were found, no further bacteriological examination was made until the next lactation.

The histological changes are classified into four groups :—interstitial, exudative and suppurative mastitis, and fibrosis. The findings are summarized according to the results of agglutination tests for *Br. abortus* and of the *post-mortem* examination.

Forty-one animals, representing 164 quarters, were classed as positive to the agglutination test. Forty-one quarters showed *Br. abortus*, 39 showed streptococci and 50 were negative bacteriologically. All classes of histological change were more frequent in the quarters which were infected with streptococci ; this was greatest in the case of exudative mastitis of which ten moderate or marked cases occurred, in contrast to four in the group of brucella-infected quarters. The 50 quarters which were negative bacteriologically showed changes somewhat similar to those of the brucella-infected group.

Thirty-two cows, representing 128 quarters, were classed as negative to the agglutination test. *Br. abortus* was isolated from three quarters. Streptococci were obtained from 38 quarters whilst 80 were negative bacteriologically. The most striking findings are the predominance of exudative mastitis and fibrosis

in the group from which streptococci were obtained and the fact that nearly half of the quarters of these negatively-reacting cows were free from any histological change.

It is noted that many of the animals which gave negative results at *post-mortem* examination had previously shown pathogenic organisms.

The authors conclude that *Br. abortus* can cause extensive changes in the udder, predominantly of an interstitial nature. They state clearly, however, that interstitial mastitis was also the predominant form in streptococcus-infected quarters and suggest as a possible explanation the fact that when streptococcus infection is present it is seldom possible to isolate brucella.

A. W. STABLEFORTH.

UDALL, D. H., & JOHNSON, S. D. (1931). **The Diagnosis and Control of Mastitis.** —*Cornell Vet.* **21.** 190-206. 8 tables. [6 refs.]

After noting the great but often unrecognized loss which is due to chronic streptococcic mastitis, the authors discuss the questions of diagnosis and control in the light of their experience in eight herds containing about 300 cows. The methods of diagnosis included examination of the physical condition of the udder and of the milk and tests for reaction, all of which are discussed at length, and cultural examination in blood agar plates.

The chief purpose of the article seems to be to stress the value of a thorough physical examination, which they consider of greater value than any other single method. They have only rarely found mastitis streptococci in otherwise normal udders and say " Perhaps the most unexpected result of our experience has been our ability to recognise mastitis by means of physical examination of the udder and chemical examination of the milk in nearly every cow whose milk was positive on the blood agar plate." In further support of their thesis they report that a single bacteriological examination may fail to reveal 20 per cent. of cases of chronic mastitis detected by other methods, though at a later date streptococci may be obtained.

They believe that the disease can be controlled by the intelligent application of skilled diagnosis and ordinary hygienic measures.

Tabulated case reports are given of eight representative routine examinations.

A. W. STABLEFORTH.

SEELEMANN, M. (1932). Experimente und Beobachtungen an Milchkühen im Rahmen der Galtforschung. II. Mitteilung. Beitrag zur Frage des Wertes der sog. Ausmelkmethode. [**Experiments and Observations on Milch Cows in the Course of Mastitis Investigations. II. On the Value of the so-called Stripping Method**].—*Arch. wiss. prakt. Tierhlk.* **64.** 530-535. 3 charts.

Experiments on two cows are reported. The first showed latent but not severe infection in all quarters. The second was infected in one quarter only. This infection, which was the first produced by milking with infected hands, had only been established about a week.

In both cases stripping was carried out every three hours, day and night, for a period of three and a half days (29 times). The streptococci still remained in all cases. Eight days later the treatment was repeated, this time on 52 occasions, and in the case of the first animal combined with thorough massage. The streptococci still remained.

It is concluded that, although a definite improvement of the condition of a quarter and a decrease in the number of streptococci may result from frequent stripping, a permanent elimination of the streptococci is hardly possible : and further, that in any case it is impracticable to treat any considerable number of quarters by continued stripping.

A. W. STABLEFORTH.

HUCKER, G. J. (1932). **The Incidence of Low Grade Streptococcus Infections in the Udder (Preliminary Report).**—*Cornell Vet.* **22.** 183-185.

To the ordinary observer there was no clinical evidence of mastitis in any of the 150 cows on which the report is based and on which *ante-* and *post-mortem* examinations were made. Streptococci were cultivated from 48 per cent. of 439 quarters, usually in numbers less than 100,000 per c.c. Of these quarters nearly 18 per cent. showed pus at *post-mortem* examination. Of the 52 per cent. from which streptococci were not cultivated, 2 per cent. showed evidence of pus at *post-mortem* ; microscopic examination of these 2 per cent. showed streptococci in all cases but one : 78 per cent. of all cows showed streptococci in one or more quarters and 21 per cent. of all cows upon which a *post-mortem* examination was made showed pus in one or more quarters.

The presence of fibrosis was determined by physical examination and confirmed *post-mortem.* Slight or marked fibrosis was present in 76 per cent. of all quarters ; 14 per cent. of these showed pus *post-mortem* and 37 per cent. streptococci.

In another part of this article it is stated that a study of 172 cows showed that only 7 per cent. did not exhibit some fibrotic tissue in one or more quarters ; and that all of these carried streptococci or showed pus at *post-mortem* examination.

The streptococci isolated had the usual characters of those associated with chronic bovine mastitis.

A. W. STABLEFORTH.

SALIB, S. (1931). Ueber den Einfluss von Kohlensäurereicher Luft und von angesäuerter Nahrung auf den Verlauf der experimentellen Milzbrandinfektion. **[The Effect of an Atmosphere Rich in Carbon Dioxide and of Acidified Food Stuffs on the Course of Experimental Anthrax Infection].**—*Zlb. Bakt. I. (Orig.).* **122.** 303-314. 1 text fig., 12 tables. [13 refs.]

An account is given of an apparatus in which guinea pigs, mice and rats were placed after inoculation with anthrax so that they could be subjected to an atmosphere containing a high proportion of carbon dioxide.

The proportions of carbon dioxide used ranged from 7 to 10 per cent. At lower percentages no very clear effect was produced, but at these concentrations life appeared to be somewhat prolonged. There was, however, no constancy in the results.

Results in mice and rats were generally less marked than in guinea pigs, but in some cases the difference was very pronounced. *Post-mortem* examination showed that the cases were typically those of anthrax except that the subcutaneous oedema was rather less in amount. The administration of acidified food (hydrochloric acid or sodium bi-phosphate) did not appear to influence the duration of life. The urine of the experimental animals became definitely acid.

LESLIE A. SHEATHER.

ANREITER, J. (1932). Ueber praktische Erfahrungen bei der Schutzimpfung gegen Milzbrand mit Carbozoo (Methode Mazzuchi). [**Practical Results in the Immunization against Anthrax with Carbozoo (Mazzuchi's Method)**]. —*Wien. tierärztl. Mschr.* **19.** 33-40.

The author reports favourably on the Italian anthrax vaccine called " carbozoo." The method of preparing the vaccine does not appear to have been published. It is claimed that by the use of the vaccine a widespread outbreak of anthrax, which had caused the death of 113 cattle, 2 horses and 2 goats, was brought to a standstill. 4,000 animals were inoculated with no ill effects and in only one case—that of a goat—was the vaccine apparently responsible for the animal's death.

A. LESLIE SHEATHER.

GRIFFITH, A. S. (1932). **The Relative Incidence of Human and Bovine Tubercle Bacilli in Tuberculous Meningitis in England.**—*J. Path. Bact.* **35.** 97-102. 2 tables. [3 refs.]

The author points out the importance of determining the relative proportion of the human and bovine types of tubercle bacilli in one or other of the different forms of human tuberculosis. Accordingly, 37 samples of cerebrospinal fluid from cases of suspected tubercular meningitis were examined during the years 1930 and 1931. Cultures of tubercle bacilli were obtained and studied from 30 of the samples. Ten (33·3 per cent.) were identified as the bovine type and the remaining 20 were bacilli of human type, two of which were dysgonic and eighteen eugonic. Reference to an earlier paper [(1929). *J. Path. Bact.* **32.** 819.] is made and the total number of cultures of tubercle bacilli obtained from the cerebrospinal fluid of cases of tubercular meningitis and examined by the author is 63, of which 19 (30·2 per cent.) proved to be of the bovine type. Using this percentage as a basis it is estimated that in England and Wales over 700 persons died of tuberculosis of the central nervous system caused by tubercle bacilli of the bovine type in each of the three years 1928 to 1930.

R. LOVELL.

PLUM, N. (1932). Om Dyrkning av Tuberkelbaciller. [**On the Cultivation of Tubercle Bacilli**].—*Skand. Vet.-tidskr.* **22.** 231-239. [12 refs.] [Summary in English : abst. from orig.]

The author reviews " the easiest, quickest and most reliable methods of cultivating tubercle-bacilli," mentioning the fundamental work carried out in this field by LÖWENSTEIN, by SUMIYOSHIS and by HOHN.

The present methods of cultivating tubercle bacilli are based upon treatment of the seed material with sulphuric acid, caustic potash or caustic soda solution as evolved by these authors.

PETRAGNANI added malachite green to the culture medium, an important modification, as it arrests the development of other bacteria and also because it appears to stimulate and hasten the growth of tubercle bacilli. A good medium is that of LUBENAUS to which malachite green has been added (SICKMÜLLER).

BESREDKA introduced fluid egg medium containing malachite green. This is the best medium for the cultivation of bovine tubercle bacilli.

Löwenstein's medium is an egg medium containing asparagin and malachite green, and K. A. JENSEN has shown that, if the seed material is homogenized in

4 per cent. caustic soda solution, the human and bovine types have different appearances and can be easily differentiated.

If Besredka's and Löwenstein's media are used for cultivating tubercle bacilli from seed material in which the presence of these bacilli cannot be demonstrated microscopically, the results may be almost as good as those obtained by the inoculation of small experimental animals, both as to demonstration of the presence of tubercle bacilli in the seed material and with respect to the determination of the type.

Finally, the importance of the addition of tuberculin to the medium is pointed out, a fact first described by TWORT and INGRAM and afterwards confirmed by HOLTH.

N. LAGERLÖF (STOCKHOLM).

GRIFFITH, A. S. (1932). **A Study of the BCG strain of Tubercle Bacillus.**—*Lancet.* **222.** 303-308 and 361-363. [21 refs.]

In this paper the author records the results of virulence tests and describes in detail the cultural characteristics of BCG. The serological reactions of the strain were found to be similar to those of mammalian tubercle bacilli.

Twenty-six guinea pigs were inoculated intraperitoneally with BCG in doses varying from 1 to 200 mg. Two guinea pigs, which had received 10 mg. each, died seven and nine days respectively after inoculation, death being caused by the irritant and toxic action of the bacilli which were disseminated throughout the body. Twenty-four of the guinea pigs inoculated intraperitoneally remained alive for the duration of the experiment which was 421 days. Griffith says in his report :—

> " None of the 62 guinea pigs inoculated subcutaneously died as the result of the injection or showed visceral lesions, although many received the relatively enormous doses of from 50 to 400 mg. Five died after parturition or from intercurrent-affections. The remainder having gained in weight were killed in from 14 to 617 days "

Cultural experiments showed that BCG persisted for a comparatively brief period in the bodies of guinea pigs ; the longest interval between inoculation and recovery of the organism was 103 days.

In feeding experiments on guinea pigs weighing from 70 to 700 g., numerous acid-fast bacilli were found in the faeces during the first two or three days, but very few bacilli appeared to pass through the alimentary mucosa. The intravenous inoculation of rabbits with BCG is sometimes followed by severe effects which may cause death from consolidation of the lungs. No joint lesions were observed in any of the inoculated rabbits. In rabbits which had been previously fed with BCG, no bacilli were demonstrated in the mesenteric glands, a result which pointed to the slight degree, if any, to which absorption occurred from the intestinal canal.

The inoculation of goats with BCG yielded interesting results. Out of 11 goats inoculated intravenously with doses ranging from 5 to 100 mg., 9 died between the 7th and the 100th day and 2 were killed 127 and 324 days respectively after inoculation. The two goats which were killed and six of those which had died showed no macroscopic tuberculous lesions and BCG was not recovered from the tissues. The remaining three goats showed definite lesions of tuberculosis, but cultures isolated from these animals when inoculated into goats and guinea pigs did not give rise to any tuberculous lesions.

Griffith reported in previous publications that he succeeded in restoring to full virulence attenuated strains of bovine tubercle bacilli by animal passage

and he has endeavoured by the same procedure to exalt the virulence of BCG, which was originally a virulent bovine strain. Seventeen strains of BCG recovered at different intervals from various species of animal failed to show any increase of virulence on subinoculation. In one experiment the organism was passaged five times (285 days) without any appreciable increase of virulence.

In order to compare the immunizing value of BCG with an attenuated strain of human tubercle bacilli obtained from lupus, Griffith inoculated two calves, aged from 3 to 4 months, one with each strain. Each calf received four inoculations, one subcutaneously of 100 mg. and three intravenously of 5, 10 and 50 mg. of the respective strains. Sixty-six days after the last inoculation each calf was given 1 mg. of virulent bovine tubercle bacilli, and at the same time two adult goats used as controls were given 0·01 mg. of the same culture. The two goats died, in 35 and 38 days respectively, from generalized tuberculosis. When killed, a year and nine months, and two years respectively after the test dose, the calves showed no signs of tuberculosis.

Griffith records three instances of spontaneous tuberculosis, one in a rabbit and two in guinea pigs, which occurred as the result of being kept in a house with tuberculous animals.

T. M. DOYLE.

I. SCHMIDT, F. (1932). Die Geflügeltuberkulose. [**Poultry Tuberculosis**].—*Deuts. tierärztl. Wschr.* **40.** 145-147.

II. HINSHAW, W. R., NIEMANN, K. W., & BUSIC, W. H. (1932). **Studies of Tuberculosis of Turkeys.**—*J. Amer. Vet. Med. Ass.* **80.** 765-777. 5 figs., 4 tables. [5 refs.]

I. This is a general article in which the pathology and importance of the avian tubercle bacillus are discussed. The author points out that there are few statistics concerning the geographical distribution of the disease, but that the evidence obtainable appears to indicate that the more crowded the conditions under which poultry are kept, the greater the incidence of tuberculosis. The tuberculin test has been practised in Germany on a fairly large scale since 1921 and has proved a valuable and simple method of preventing the heavy economic losses caused by this disease.

II. Tuberculosis in turkeys has been recognized in California and Nevada only where contact with tuberculous chickens has occurred. The lesions are mainly abdominal, essentially the same as in the fowl, and the type involved is probably always avian. Mycosis, blackhead and tumours must be differentiated. The tuberculin test was not found to be as accurate as in chickens ; the skin of the wing-web is considered to be the most suitable site of inoculation ; in 72 per cent. of healthy and 76 per cent. of tuberculous turkeys the wing-web test was found to agree with the findings at autopsy, whilst the wattle test was found to show only 49 per cent. and 11 per cent. agreement respectively.

NORMAN HOLE.

RAUTMANN, H., & SPIEGL, A. (1931). Untersuchungen über die Tuberkulose des Geflügels mit besonderer Berücksichtigung der Ei-Infektion und der Empfänglichkeit des Huhnes für die drei Tuberkelbazillentypen. [**Tuberculosis of Birds with Special Reference to Infection of the Egg and the Susceptibility of the Fowl to the Three Types of Tubercle Bacilli**].—*Zschr. Infektkr. Haust.* **40.** 64-79. [2 refs.]

Groups of experiments have been carried out to investigate the occurrence

of tubercle bacilli in the eggs, blood and faeces of naturally infected hens. Egg infection experiments were also undertaken.

In the first group, eggs from naturally infected birds and from birds hatched out from eggs which had been deliberately infected with the three types of tubercle bacilli were examined microscopically. Finally, fresh market eggs were examined to ascertain if tubercle bacilli were present in them. The examination of eggs derived from naturally infected stock yielded very unsatisfactory results. Acid-fast bacilli were found in 1·8 per cent. of the eggs and in only one instance out of 159 tests (Wahby's technique) was a culture obtained. This culture was non-pathogenic. 104 eggs from birds which had been hatched out of eggs inoculated with one or other of the three types of tubercle bacilli were examined microscopically and culturally; no tubercle bacilli could be found in any of them. Twelve market eggs were examined microscopically and by inoculation, but no evidence of the presence of tubercle bacilli was obtained.

No evidence could be found in the course of 154 tests that tubercle bacilli are present in the blood of naturally infected fowls.

Forty-one samples of faeces from birds reacting to tuberculin were examined microscopically after treatment with antiformin; in only three cases were bacilli found. Two of the birds were proved to have tuberculosis of the intestine and in the third the liver was diseased.

In the experiments regarding the artificial infection of eggs with the three types of bacilli, 25 eggs were included in each group and varying doses of bacilli were injected. Control eggs treated in various ways were incubated at the same time.

It was found that the human type of bacillus was capable of infecting the chicks and it could be demonstrated culturally in the birds' organs two months after hatching; it was also found that the human type of bacillus can persist in the birds' organs for several months without producing any recognizable lesions.

Poultry would appear to possess a natural immunity against bacilli of the human and bovine types. In the immense majority of cases the bacilli of these types do not produce any lesions at all, but if there is any tissue reaction the affected area rapidly becomes encapsuled.

A. LESLIE SHEATHER.

CARNE, H. R. (1931). **The Occurrence of Green Pus in Suppurative Lesions of the Sheep.**—*J. Sci. & Indust. Res. Australia.* **4.** 232-233.

In this paper the author states that the prevalent idea that green pus in sheep indicates infection with *Corynebacterium ovis* is an erroneous one. He produces evidence from practice to prove that this organism does not always cause the production of green pus and that other organisms may produce green pus in sheep. He considers that the green tinge is a product of sheep pus irrespective of the organism causing it. For example, *C. pyogenes* causes green pus in sheep and cattle, but *C. ovis* causes green pus in sheep and a thick yellowish pus in cattle.

Attempts to extract the green colouring matter from sheep pus with various chemicals were all unsuccessful. A footnote states that in 1901 GILRUTH suggested that green pus owed its origin to the ovine system.

J. E.

BURKE-GAFFNEY, H. J. O'D. (1931). **The Classification of the Colon-aerogenes Group of Bacteria in Relation to their Habitat and its Application to the**

Sanitary Examination of Water Supplies in the Tropics and in Temperate Climates. A Comparative Study of 2,500 Cultures.—*J. Hyg. Cambridge.* **32.** 85-131. 19 tables. [150 refs.]

The author has given an excellent survey of current knowledge regarding the colon-aerogenes group of bacteria and the various tests employed to determine the origin, faecal and non-faecal, of such bacteria. A total of 1,923 cultures from water samples, urine, soil and faeces was studied in Dar es Salaam. The fermentation of lactose and production of indol tests alone are considered unsatisfactory for assessing the sanitary condition of water in a tropical area, and it is emphasized that other tests should be employed ; of these the methyl-red (MR), Koser's citrate and the fermentation of saccharose and a direct plating method are advocated. The latter method consists of inoculating definite quantities of the water into a medium made up of the glucose-phosphate-peptone medium as used in the methyl-red test, solidified with agar and brom-thymol blue added as an indicator. In this medium, *Bact. coli* colonies appear as discrete lemon yellow discs whilst those of the *Bact. aerogenes* type are green. Incubation tends to distinguish the colonies still further. It is suggested that in the tropics local conditions should be studied and that a survey of the predominating coliform organisms in faeces, soil and waters be made before a standard of purity can be laid down and that the constancy of bacteriological findings may be of more importance than arbitrary numerical standards. It is, however, suggested that one should regard as excretal those coli bacteria which ferment lactose, grow as yellow colonies on the glucose-phosphate-brom-thymol-blue agar, produce indol, are MR positive, and fail to grow in citrate medium ; saccharose fermenters to have less significance regarding recent pollution than saccharose non-fermenters ; MR + K + (ability to grow in Moser's citrate medium) to have less significance than MR + K − and MR − K + to have less significance than either.

The author also studied in Ireland 577 cultures and found in this series that the lactose and indol tests were more frequently confirmed by the citrate and methyl-red tests than in the tropics. In the tropical series a large number of bacteria were found to be intermediate between *Bact. coli* and *Bact. aerogenes* in that they were indol positive and citrate positive.

R. LOVELL.

I. CLARENBURG, A. (1931). Voedselvergiftigingen door bacterien uit de Salmonellagroep. [**Food Poisoning caused by Bacteria of the Salmonella Group**].—*Tijdschr. Diergeneesk.* **58.** 1098-1111. [25 refs.] [Summary in English : abst. from orig.]

II. CLARENBURG, A. (1932). Vleeschvergiftiging door Bacillus suipestifer. [**Meat poisoning by** *Bact. suipestifer*].—*Ibid.* **59.** 303-310. [Summary in English : abst. from orig.]

I. The author deals with food poisoning caused by meat and milk. In the case of milk there may be actual infection of the udder by organisms belonging to the salmonella group, but milk may act as a vehicle only in conveying bacilli introduced into it through the medium of faeces. The same applies with regard to food poisoning. It is necessary to distinguish between infection due to the ingestion of meat derived from animals actually infected with salmonella and meat which has become contaminated after slaughter.

Strains of paratyphoid bacilli isolated from cases of infection should be identified by agglutination tests with appropriate antisera and *B. suipestifer*

antiserum should be included. In cases of suspected food poisoning the serum and the faeces of the patient should be submitted to examination. Organisms recovered should be tested by feeding to and inoculation of mice.

II. The author describes three cases of non-fatal gastro-enteritis in human beings which were connected with the presence of *B. suipestifer* in smoked pork and smoked sausages containing pork and beef. The cases did not occur all at one time, but were encountered during a period of two years. No indication is given regarding the location of the cases.

The bacillus (Kunzendorf type) was recovered from the faeces of two of the cases. Other persons who ate the same meats showed no symptoms of ill health, but agglutinins were found in the sera of 16 persons.

A. LESLIE SHEATHER.

DAVID, H. (1932). Ueber eine durch Paratyphus-Enteritis-Bakterien verursachte Futtermittelvergiftung bei Rindern. [**Food Poisoning in Cattle caused by Paratyphoid-Enteritis Bacteria**].—*Wien. tierärztl. Mschr.* **19.** 41-46. [8 refs.]

In this paper the author describes an outbreak of disease in cattle which it is stated was due to infection with organisms of the paratyphoid group and some brewers' grains were incriminated as the vehicle.

Five cows presented symptoms of loss of appetite and profuse offensive diarrhoea. The pulse was strong and normal and the temperature rose to 41·4° C. Treatment with intestinal disinfectants was without effect and the cases ceased to occur when the feeding of the recently supplied brewers' grains was stopped. There were six cases in all and five of these recovered ; the 6th case was slaughtered. Paratyphoid bacilli were found in the tissues and organs. A sample of the grains was sent to the Agricultural Institute for chemical examination and it was reported upon as being very sour and unfit for food.

In the faeces of three of the recovering animals paratyphoid bacilli were demonstrated, while they could not be found in the faeces of the other two or in the faeces of healthy animals on the premises. The blood of all the animals was sterile.

Agglutination tests were carried out with a number of strains of organisms and while it was not found possible to identify the strain exactly, it appeared to approximate most closely to the Breslau type.

No answer can be given to the question as to how the brewers' grains became contaminated.

A. LESLIE SHEATHER.

HEATLEY, T. G. (1931). **A Note on Contagious Abortion in Mares.**—*Vet. Rec.* **11.** 1204-1205.

The author records a series of six cases of abortion in mares caused by *Bact. abortus equi* all of which occurred during the summer, the disease following a similar course in each instance.

He states that, in abortions observed during winter and spring, the foetus was usually expelled shortly after death had occurred and that the condition was generally attributed to dietetic errors, accidents, work or illness.

In the cases to which he now draws attention the foetuses had been dead for some time and were decomposed. The temperature was raised within a few hours

of the abortion occurring and was accompanied by a dirty chocolate coloured discharge from the uterus.

Daily douching of the uterus was successful in clearing up the infection.

T. M. DOYLE.

MAGNUSSON, H. (1932). Bacillus abortus Bang och bursiter hos nötkreatur. [*Bacillus abortus* **Bang and Bursitis in Cattle**].—*Skand. Vet.-tidskr.* **22.** 33-49. 2 figs., 3 tables. [12 refs.] [Summary in English: abst. from orig.]

The author has tested the agglutination reactions to *Br. abortus* of the blood and of the contents of affected bursae of cattle affected with bursitis, and attempted to demonstrate the existence of the organism in the bursal contents. Out of 203 affected cattle, 79 (39 per cent.) gave positive agglutination reactions, while out of 1,055 cattle from the same part of the country and of the same age, unaffected with bursitis, only 122 (12 per cent.) reacted.

In most cases the blood showed a higher titre than the bursal fluid which, according to the author, indicates that the conditions regarding agglutination are different from those relating to Bang mastitis and also that the agglutinins are not always transferred from the Bang bursitis to the blood.

Br. abortus was demonstrated in bursal fluid in 11 cases. In one instance, virulent bacilli were isolated from an old, dry bursitis with caseous foci. The author seems to be of the opinion that Bang infection is not the cause of bursitis, but considers that it is of a traumatic nature. Bursitis lesions, however, easily become reservoirs for *Br. abortus*. In the same way as some animals retain the bacilli in their udder and thus become carriers, the bacilli remain in the bursae.

N. LAGERLÖF (STOCKHOLM).

REIS, J. (1931). Conservation de la *Pasteurella avicida* sur des cadavres en décomposition. [**The Survival of** *Pasteurella avicida* **in Decomposing Carcasses**].—*C. R. Soc. Biol. Paris.* **107.** 648.

The object of the experiments was to determine for what length of time after death a diagnosis of fowl cholera could be made by examination of the carcass. Fowls which had died of the disease were buried at a depth of 50 cm. and exhumed from time to time, cultures and animal inoculations being made. After burial for one day a diagnosis could be made by cultural means alone, but by the third day this was impossible. Whether the carcasses were buried or exposed to air a diagnosis by animal inoculation could be made at least up to the 11th day. It was not considered necessary to carry the work further, as a diagnosis after 11 days is seldom called for.

R. S. ROBERTS.

DE VOLT, H. M., & DAVIS, C. R. (1932.) **A Cholera-like Disease in Turkeys.**—*Cornell Vet.* **22.** 78-80.

The authors describe an outbreak of disease in a flock of turkeys, which was possibly caused by the fowl cholera bacillus. Death took place suddenly and the mortality was 17 per cent. A Gram-negative organism which proved lethal to chickens in 24 hours was obtained from the liver and heart blood of dead birds.

[The test dose was inoculated intravenously and was very large, i.e. 1 c.c. of a saline suspension of the organism].

NORMAN HOLE.

ROBERTS, R. S. (1931). **Ovine and Bovine Strains of** *B. chauvoei*.—*J. Comp. Path. & Therap.* **44.** 246-251. [10 refs.]

The starting point of the author's investigations was the observation which has frequently been recorded that, while in bovine animals which have died of infection with *B. chauvoei* no wounds can as a rule be found, in sheep it is almost invariably possible to find an injury by way of which infection has taken place. A number of investigators have expressed the view that no clear differences can be found between the organisms causing blackquarter in sheep and bovines.

After making experiments with organisms isolated from cases of spontaneous blackquarter in a sheep and a bovine and also from a case of gas-gangrene in a sheep, by agglutination, cross-agglutination and absorption tests, the author came to the conclusion that, while there is to a large extent community of antigenic power, none of the strains were capable of removing agglutinins completely from heterologous antisera.

Experiments carried out with heated antigens indicated that there was a common antigen of low value and heat-labile antigens which were specific for the various strains used in the tests.

A. LESLIE SHEATHER.

SCOTT, J. P. (1932). **Blackleg Immunization.**—*J. Amer. Vet. Med. Ass.* **80.** 848-862. 7 tables. [41 refs.]

This article gives a lengthy review of the subject of immunization against bovine blackquarter, with an account of the production of vaccine and serum at the Kansas Agricultural Experiment Station. The methods employed to estimate the potency of aggressin are of interest. Series of guinea pigs are inoculated with large doses of immune *B. chauvoei* serum and 15 hours later with a mixture of a small dose of culture and varying quantities of the aggressin or filtrate to be tested. The amount of aggressin or filtrate necessary to render the small dose of culture lethal is regarded as a measure of the potency.

An alternative method is to regard the amount of aggressin or filtrate necessary to activate one potential m.l.d. of washed bacteria as a measure of potency. Scott states that an aggressin or filtrate containing 13 units or more is efficient enough to protect animals against blackleg. He presumably bases this statement on the success of vaccination in the field.

Details are given of two immunization experiments on calves. In the first, a number of calves were immunized with doses of filtrate containing 6·5 to 16·5 aggressin units ; 10 to 16 days later, along with two control calves, they were inoculated with virulent culture. All the protected animals survived and the controls died. In the second experiment, the test dose was administered 30 days after the filtrate and no immunity was demonstrated, although the test dose failed to kill a control animal. The author concludes his discussion of the experiments with the suggestion that the aggressive strength of blackleg filtrate as determined by guinea pig tests is a more accurate criterion of potency than calf protection tests. He does not draw the conclusion that the immunity conferred upon the calves was of a transient nature.

Experiments have been made on guinea pigs to determine the effect of

formaldehyde upon aggressin and filtrates, and the keeping properties of the formolized products at room temperature, body temperature and in a cold store have been investigated. It was found that formaldehyde definitely improved the immunizing qualities of blackleg aggressin, filtrates and cultures and that the optimum increase in potency was obtained when 1·25 per cent. of formalin (0·5 per cent. formaldehyde) was added. No improvement was noted with higher concentrations. Aggressin kept at body temperature solidified in seven days and in nine weeks at room temperature ; it remained fluid for 15 weeks in cold storage. No loss of potency occurred in formolized filtrates or in cultures kept for 40 weeks at room or body temperature.

Details of the immunization of horses for the production of blackleg serum are given. It was found that formolized filtrates and cultures produced as potent a serum as whole cultures.

Organisms associated with *B. chauvoei* in cases of blackleg are discussed and the use of a polyvalent bacterin is suggested on theoretical grounds. The monovalent products have practically eliminated blackleg from the affected districts of Kansas.

R. S. ROBERTS.

I. LAUD, D. S. (1931). **A Case of Tetanus in a Wild Ass (Equus hemionus) of the Zoological Collections of the Victoria Gardens (Bombay).**—*Ind. Vet. J.* **7.** 253-256.

II. HOPSON, C. G. (1932). **Tetanus in a Cat.**—*Vet. Rec.* **12.** 302.

III. KAUFMANN, R., & GALEA, M. (1931). Du tétanos d'origine digestive. [**Tetanus of Digestive Origin**].—*C. R. Soc. Biol. Paris.* **107.** 1459-1460.

I. The author describes the successful treatment of a case of tetanus in a wild ass by the subcutaneous administration of magnesium sulphate and anti-tetanic serum and internal dosage with calomel and belladonna.

II. Six days after castration a kitten showed symptoms of tetanus. By the 9th day the symptoms were very pronounced and the animal was destroyed. The scrotal wounds appeared to be healing normally.

III. The authors were not successful in their efforts to produce tetanus in guinea pigs by making operative wounds in the digestive mucosa and then mixing the bacilli or spores of *B. tetani* with the food. One case did indeed occur, but as the animal had burst its wound sutures the infection may have occurred from other sources.

NORMAN HOLE.

TALICE, R. V., MORELLI, J. E., & CALGADA, V. (1931). Nouvelle technique pour l'inoculation des *Trichophyton* faviformes au Cobaye. [**New Technique for the Inoculation of Guinea Pigs with Faviform Trichophyta**].—*C. R. Soc. Biol. Paris.* **108.** 903-904.

The authors have found that scarring the skin of guinea pigs by cold by means of the Vignat cryo-cautery facilitates the transmission of ringworm parasites to that species. Failure followed experiments in which the scarring of the skin was produced by heat.

A. LESLIE SHEATHER.

FELLINGER, K. (1931). Zur Kultur der Aktinomyzeten. [**The Cultivation of Actinomyces**].—*Zlb. Bakt., I.* (*Orig.*). **122.** 361-373. 3 figs., 1 table. [10 refs.]

Before attempting to get cultures of actinomyces the author used sulphuric acid for the destruction of contaminants. The strength used varied from 8 to 15 per cent. according to the types of contaminant found, either by microscopical examination or by preliminary cultivation, to be present in the seed material.

The acid was mixed with the pus in equal amounts in such final concentration that it ranged from 4 to 7·5 per cent. It would not appear to be of importance to vary the percentage as it is stated that the majority of the strains of actinomyces studied were capable of resisting 10 per cent. acid even when the growth was suspended in salt solution. The acid was allowed to act for ten minutes and could then be neutralized or, preferably, the liquid could be centrifuged and the sediment washed.

A new culture medium which the author recommends has the following composition :—

Solution A.		Solution B.	
Saponin (white, Merck) ...	10 g.	Potassium-mono-hydrogen phosphate	1 g.
Nervina malt sugar ...	50 g.	Magnesium sulphate ...	1 g.
Distilled water ...	*ad* 200 c.c.	Sodium citrate	1 g.
		Asparagin	5 g.
		Glycerin	50 g.
		Distilled water ...	*ad* 1,000 c.c.

The asparagin is carefully powdered in a mortar and dissolved in hot water ; the saponin is best dissolved by boiling in water. Solutions A and B are mixed and distributed into flasks in quantities of 150 c.c., and 6 g. of potato-meal are then added to each flask. The medium is then boiled for a quarter of an hour, during which time it is shaken frequently and afterwards left at 56° C. for one hour. Five eggs are then added to the mixture and thoroughly incorporated, and 4 c.c. of 2 per cent. congo red are added. Finally, the medium is strained through sterile gauze into tubes which are heated in a slanting position at from 80° to 95° C. for one hour on each of two consecutive days. The tubes should then be sealed with wax, as drying destroys the value of the medium.

The best results are obtained when the tubes are incubated under anaerobic conditions.

A. LESLIE SHEATHER.

DISEASES CAUSED BY PROTOZOAN PARASITES.

LESTOQUARD, F. (1931). Transmission au buffle des piroplasmes du boeuf. Modifications subies par *Anaplasma marginale*. [**Transmission of Bovine Piroplasms to the Buffalo. The Resulting Modification of** *Anaplasma marginale*].—*Bull. Soc. Path. exot.* **24.** 820-822.

Splenectomy was performed on a two months old buffalo calf. A week later the blood was examined daily, but no parasites were detected. The young buffalo was then inoculated intravenously with 20 c.c. of blood from a splenectomized calf in which *Babesia bigemina*, *Babesiella berbera* [*Babesia bovis*], *Theileria mutans* and *Anaplasma marginale* had been detected. *B. bigemina* appeared on the 8th day, *Babesiella berbera* [*Babesia bovis*] on the 13th and *A. marginale* appeared on the

10th day and was still evident on the 25th day. Clinical symptoms of disease were slight; *A. marginale* took up a central position in the corpuscle of the buffalo, giving the appearance of *A. centrale*. In a second buffalo calf which had not been splenectomized the experiment was repeated with similar results, except that *Babesiella berbera* [*Babesia bovis*] did not appear.

U. F. RICHARDSON.

REES, C. W. (1931). **Some Effects of Splenectomy on the Blood of Carriers of Anaplasmosis.**—*J. Parasitol.* **18.** 128.

HISEL, C. C. (1931). **History and the State's Responsibility in the Control of Anaplasmosis in Oklahoma.**—*Vet. Med.* **26.** 507-508.

MOTTET, & BÜCK. (1931). Sur quelques cas d'anaplasmose chez des zébus. [**Some Cases of Anaplasmosis in Zebu Cattle**].—*Bull. Soc. Path. exot.* **24.** 969-971.

The first paper was presented at the 7th Annual Meeting of the American Society of Parasitologists, New Orleans, and records the results of splenectomy in 14 cattle and 5 sheep which were carriers of anaplasms. The results confirm those of DE KOCK and QUINLAN in South Africa. In addition it was found that, while splenectomy in cattle increased the virulence of the anaplasms for other cattle, splenectomy in the sheep appeared to lead to a decrease in the virulence of the organism.

The second paper records serious losses from anaplasmosis in Oklahoma, where the disease appeared ten years ago. The author considers that an investigation into the method of transmission in this area is necessary, stating that *Dermacentor sanguineus* has been blamed, but that actually this parasite is not present in Oklahoma and local suspicions have been directed to *Tabanus atratus* and *Tabanus lineola*.

The third paper records an outbreak of disease associated with the appearance of *Anaplasma marginale* in the blood of eight zebu cattle at Tananarivo. Two animals died suddenly and six recovered on treatment with sulphate of soda and change of feeding. [It appears doubtful whether the two deaths were due to anaplasmosis. The diagnosis was made by blood examination and subinoculations were not carried out].

U. F. RICHARDSON.

GREEN, R. T. B. (1931). **A Malarial Parasite of** *Macacus cynomolgus* **and its Development in Mosquitoes (Preliminary Note).**—*Trans. Roy. Soc. Trop. Med. Hyg. London.* **24.** 649-650.

BALL, G. H. (1931). **Observations on the Life History of Chilomastix.**—*J. Parasitol.* **18.** 115.

LUCAS, Miriam S. (1931). **Observations on** *Cyathodinium piriforme*, **an Endozoic Ciliate of the Guinea-Pig.**—*Ibid.* 123.

TSUCHIYA, H. (1931). **The Localisation of** *Giardia canis* **(Hegner, 1922) as affected by Diet.**—*Ibid.* 132.

The last three papers were presented at the 7th Annual Meeting of the American Society of Parasitologists.

The first paper deals with a malarial parasite of monkeys in Malaya which in some respects resembles *Plasmodium kochi* of Africa and in others *P. inui* of

Borneo. When *Anopheles maculatus* and *A. kochi* were fed on infected monkeys, sporozoites resembling those of tertian malaria developed in the salivary glands. The author draws attention to the caution necessary in malarial surveys in judging the importance of gland spirozoites. In monkeys the disease was associated with mild anaemia.

The second paper deals with the cultivation of *Chilomastix mesnili*. This organism would not grow below pH 4·0 or above pH 9·0. Encystment did not occur in cultures, but would occur in the caecum of chickens. The stimulus required to produce encystment was not ascertained.

The third paper deals with cyathodinium infection in American guinea pigs. Only one species was encountered (*Cyathodinium piriformis*) ; it occurred in pyriform and in conical forms and 52 per cent. of guinea pigs were found affected.

The fourth paper deals with the effect of diet on the localization of *Giardia canis* in infected puppies. On a carbohydrate diet the maximum concentration of giardia was in the duodenum from 10 to 30 inches from the stomach, whilst on a diet rich in protein it was in from 25 to 40 inches from the stomach. Trophozoites were more numerous in the puppies when the diet was rich in carbohydrate which suggests that this diet favours the parasite. Encystment occurred at the level at which the bacterial flora commenced to show a complex type and it may be considered a natural reaction to unfavourable environment.

U. F. RICHARDSON.

CLARK, H. C. (1930). **A Preliminary Report on Some Parasites in the Blood of Wild Monkeys of Panama.**—*Amer. J. Trop. Med.* **10.** 25-41. 5 plates. [6 refs.]

Blood samples from 113 wild monkeys from an uninhabitated region of Panama were collected during the month of July and examined for parasites, with the following results :—*Ateles geoffroyi* (red spider monkey, 24 specimens examined), tertian-like malaria parasites found in 7, microfilariae found in 22, none found to be infected with trypanosomes ; *Cebus capucinus imitator* (Panama white-throated monkey, 31 specimens examined), quartan-like malaria parasites found in 3, microfilariae in 27 and trypanosomes in 13 ; *Saimiri örstedii örstedii* (Titi monkey, 54 examined), no malaria parasites found, microfilariae in 49 and trypanosomes in 14 ; *Alouatta palliata inconsonans* (Panama howling monkey, 4 specimens examined), all infected with trypanosomes, but no other blood parasites were seen.

Attempts to transfer the various parasites to guinea pigs and to *Macacus rhesus* by blood inoculations were not successful.

E. L. TAYLOR.

LINTON, R. W., & POINDEXTER, H. A. (1931). **Artificial Acidosis in Trypanosoma lewisi infections and its Bearing on the Pathogenic Action of Trypanosoma equiperdum.**—*J. Exp. Med.* **54.** 669-680. 4 tables. [7 refs.]

The alkali reserve in rats was artificially lowered by the injection of ammonium chloride. If the rats were infected with *T. lewisi* and the infection was in its first period, a marked and rapid rise in the number of trypanosomes occurred. As the infection approached the crisis, the injection of the chloride was followed by a less and less pronounced rise in the number of organisms until at the crisis it had no effect. This increase in numbers was not due to contraction of the capillaries

of internal organs, nor to a greater reproductive activity on the part of the organisms, but it was presumably due to an inhibition of the destructive forces of the host. It is suggested that the production of organic acids by pathogenic trypanosomes similarly inhibits the destructive mechanism of the host, although the injection of sodium bicarbonate had no effect in lessening the severity of an infection with *T. equiperdum*.

W. R. WOOLDRIDGE.

TALIAFERRO, W. H., CANNON, P. R., & GOODLOE, Sara. (1931). **The Resistance of Rats to Infection with *Trypanosoma lewisi* as affected by Splenectomy.**—*Amer. J. Hyg.* **14.** 1-37. 3 figs., 10 tables. [26 refs.]

The authors base their results on the fact that, in rats infected with *T. lewisi*, the first sign of immunity is the disappearance of dividing forms of the trypanosome. Later the trypanosomes assume a uniform adult form and finally they disappear. Experiments with rats are complicated by bartonella infections, to which relapses occur if splenectomy is performed.

The authors found that, in rats free from bartonella, splenectomy did not influence the course of the trypanosome infection, whilst, in rats infected with bartonella, splenectomy increased the period of trypanosome multiplication and also the period during which short variant forms were present. In young rats splenectomy had the greatest effect five to ten days after infection whilst in old rats, in addition to an effect during the early period, short variants also appeared when splenectomy was carried out between the 40th and 60th days. After blockade with India ink, rats free from bartonella reacted to splenectomy similarly to animals suffering from bartonella infection.

The authors suggest that the macrophage system has a functional level which can check multiplication of *T. lewisi* in eight days. This level is lowered by splenectomy, but there is a margin of safety which is sufficient to prevent multiplication unless it is reduced by bartonella, India ink blockade, or other means. They explain the difference in reaction in young and in old rats by a difference in the titre of the circulating antibody.

U. F. RICHARDSON.

—. (1931). Ordonnance du Haut-Commissaire concernant la prophylaxie de la dourine. [**Regulations for the Control of Dourine**].—*Bull. Off. internat. Epiz.* **5.** 888-891.

These regulations, which are known as the "Dourine Rules 1931," have been drawn up for the control of dourine in Palestine and do not lend themselves to abstraction.

A. LESLIE SHEATHER.

VAN DEN BRANDON, F., & NÉLIS, P. (1932). La Trypanosomiase du cobaye et l'injection massive de B.C.G. [**Trypanosomiasis of the Guinea Pig and the Injection of Large Doses of BCG**].—*Ann. Soc. belge. Méd. trop.* **12.** 173-180. (5 refs.]

Available evidence goes to show that various strains of streptococci, Preisz-Nocard bacilli and toxins such as diphtheria toxin inoculated at the same time as BCG are entirely without effect upon the stability of the vaccine. There is

little or no evidence regarding the effect of infection with trypanosomiasis upon the course of tuberculosis, but it would appear that in chronic malaria there is a tendency for increased resistance to develop.

The authors therefore carried out experiments in which guinea pigs were inoculated with *T. gambiense*, *T. cruzi* and BCG. While in some instances lesions containing large numbers of BCG organisms could be found in guinea pigs of the first passage, it was not possible to carry on the infection direct from guinea pig to guinea pig.

A. LESLIE SHEATHER.

KLIGLER, I. J. (1931). **Susceptibility and Resistance to Trypanosome Infection. VIII.** *In vitro* **Demonstration of Specific Agglutinating and Trypanolytic Antibodies in the Serum of Infected Guinea-Pigs.**—*Ann. Trop. Med. & Parasitol.* **25.** 377-392. [10 refs.]

An intermittent course is characteristic of trypanosome infections, but the mechanism of the relapsing nature has not been determined. A number of investigators have demonstrated lytic bodies in normal human serum and in the sera of infected animals. The effect has not yet been demonstrated *in vitro*.

These observations have prompted re-investigation of the properties of sera from rats and guinea pigs following the sudden disappearance of trypanosomes from the circulation.

The testing fluid was composed of 5 parts serum, 3 parts glycosal solution and 2 parts M/30 phosphate buffer mixture of pH 7·8, and incubation was carried out at from 25° to 28° C. In this mixture trypanosomes remained infective for at least three days and the effects of serum could be observed.

The tests were put up as follows :—1 c.c. of serum-glycosal mixture was placed in each of a series of tubes. To each of these was added decreasing amounts of the serum to be tested and then trypanosome suspensions from an infected rat in an equal quantity. The suspension was added so as to give a final concentration of not more than 5,000 trypanosomes per c.c. The suspensions were incubated and examined at intervals. Rats were also inoculated to test the infectivity of the mixtures. Details of a number of experiments in which various factors were subject to modification are given.

It was found that the trypanolytic activity of sera following a crisis is comparatively low. The majority of sera were inactive in dilutions beyond 1 : 20.

Contact with sera increased the resistance of the parasites to the lysis, but passage through rats restored the normal degree of susceptibility. The trypanolysins are partially destroyed at 65° C. and completely destroyed after exposure for 30 minutes at 70° C. Lysis would appear to be seldom or never complete. Even when no live forms can be found by microscopic examination, a biological test gives a positive result.

The author expresses the opinion that trypanosomes possessing varying degrees of resistance exist. Multiplication and lysis proceed simultaneously, but when a large number of trypanosomes occur in the blood a large proportion of these are of low resistance and the simultaneous presence of a high concentration of lysin causes a rapid destruction of the parasites. In rats no lysin could be detected at any stage of infection by *in vitro* tests. In this species the effect of splenectomy suggests that the principal defence is a cellular one. There is in rats a steady multiplication of parasites until death occurs. Destruction cannot keep pace with multiplication.

A. LESLIE SHEATHER.

PARROT, L., DONATIEN, A., & LESTOQUARD, F. (1931). Observations nouvelles sur le développement du parasite de la leishmaniose viscérale du chien chez un phlébotome (*Phlebotomus perniciosus*). [**New Observations on the Development of the Parasite of Canine Intestinal Leishmaniasis in a Phlebotomus** (*Phlebotomus perniciosus*)].—*Arch. Inst. Pasteur d'Algérie.* **9.** 438-441. [3 refs.]

CHAILLOT, L., & SAUNIE, L. (1931). Observation d'un cas de leishmaniose canine cutanée rappelant le bouton d'Orient. [**Observation on a Case of Cutaneous Canine Leishmaniasis simulating Oriental Sore**].—*Bull. Soc. Path. exot.* **24.** 535-538. [7 refs.]

Wild phlebotomi were allowed to enter a kennel in which a dog suffering from leishmaniasis was kept. After engorgement the females were captured, starved for two or three days and then dissected. It was found that they would not live in captivity more than about four days. Fifty-eight flies were examined and leptomonas forms were found in the anterior part of the gut in 14 of them. None were found below the point of origin of the malpighian tubes.

In the second paper the authors report a case of cutaneous leishmaniasis in a dog at Beyrout. The serum gave positive complement fixation tests with *L. donovani* and *L. tropica.*

U. F. RICHARDSON.

JADIN, J. (1932). La photo-sensibilité de quelques parasites. [**The Photo-sensibility of Certain Parasites**].—*C. R. Soc. Biol. Paris.* **110.** 124-125. [2 refs.]

The author has studied the effects of fluorescent substances upon trypanosomes and spirochaetes. In the first series the effects were studied *in vitro* and in the second the effects were studied upon parasites taken from animals which had been treated with fluorescent substances. Exposure to a solution of trypaflavine at 1 : 2,000,000 for 10 seconds caused trypanosomes to become photosensitive, so that exposure to the light of the ultramicroscope rendered them inactive in from 70 to 80 seconds. With a solution of 1 : 100,000, light rendered them inactive in a few seconds only. Eosin and erythrosine render trypanosomes photosensitive, but stronger solutions are required. 1 : 100,000 appeared to be the optimum. No action could be detected in the case of fluorescine.

Similar results were obtained in animal experiments. It was sufficient to inject a mouse of 20 g. weight with 1 : 5,000 dilution of trypaflavine to render trypanosomes, spirochaetes and *Spirillum minus* photosensitive. Eosin and erythrosine have not the same power *in vivo* as they show *in vitro.* The intensity of the light appears to be of little or no importance.

Organisms of the typhoid group, colon bacilli and the *Bacillus pyocyanenus* are not rendered photosensitive by non-toxic dilutions of trypaflavine.

A. LESLIE SHEATHER.

VELU, H., BALOZET, L., & ZOTTNER, G. (1931). Influence de la splénectomie dans l'infection expérimentale par *Spirochaeta hispanicum.* [**Influence of Splenectomy in Experimental Infection by** *Sp. hispanicum*].—*C. R. Soc. Biol. Paris.* **106.** 890-892. [5 refs.]

VELU, H., BALOZET, L., & ZOTTNER, G. (1931). Influence du blocage du système réticulo-endothélial dans l'infection expérimentale par *Spirochaeta*

hispanicum. **[Influence of Blockage of the Reticulo-endothelial System in Experimental Infection by** *Sp. hispanicum*].—*Ibid.* 892. [1 ref.]

From experiments on seven guinea pigs, three rabbits and a dog, which were splenectomized before or at different intervals after infection, it is concluded that splenectomy is without action on infection with *Sp. hispanicum*.

Four guinea pigs, inoculated from 38 to 55 days previously with *Sp. hispanicum*, were given intracardially 1 c.c., 1 c.c. and 0·5 c.c. of Chinese ink diluted 1 : 20 on three successive days.

Examination of the blood up to the 16th day failed to show any evidence of a reappearance of spirochaetes. It is concluded that blockade of the reticulo-endothelial system does not favour reinfection of the blood from the brain.

A. W. STABLEFORTH.

DISEASES CAUSED BY FILTRABLE VIRUSES.

VON LÁSZLÓ, S. (1932). Untersuchungen über das Maul- und Klauenseuchevirus in Oesterreich. **[Research on Foot and Mouth Disease in Austria]**.—*Arch. wiss. prakt. Tierhlk.* **65.** 75-82. 9 tables.

The author isolated strains of virus from three natural outbreaks of foot and mouth disease in Austria and sought to identify them according to type and to see whether they would retain their purity after passage through animals. The three strains were checked against samples of Types A, B and C obtained from Riems. According to the author the three Riems strains were indistinguishable from each other and each of the strains he isolated was similar to all three of the Riems strains.

The Austrian strains did not differ immunologically even after 15 guinea pig passages.

J. E.

ANDRIEVSKY. (1931). Sur la préparation du vaccin contre la peste bovine et son application méthodique. **[The Preparation and Use of Rinderpest Vaccine]**.—*Rev. gén. Méd. vét.* **40.** 728-733.

The author advocates the use of tissue vaccines for immunization against rinderpest. He considers that efficient vaccination can be carried out, using 3 or 4 g. of spleen or lymph gland, and that it will protect animals against inoculation with 2 or 3 c.c. of very virulent blood. With this material, one calf can provide enough vaccine for 100 inoculations.

Two kinds of vaccines have been tested at Bamako, French West Africa. One is a dry vaccine prepared from spleen, tonsils and lymph glands (other than mesenteric) of an acutely affected animal ; for use the dry powder is mixed with formolized water and after keeping for 48 hours is ready for use. This vaccine is absorbed very slowly, but it has never been known to produce abscess formation. Chloroform or toluol vaccines, on the other hand, frequently cause local trouble. The second vaccine is the " lipo-vaccine " of PRUNIER [see this *Bulletin*. **2.** 550]. The organ tissue is formolized after extraction and is later mixed with castor oil and used as an emulsion for inoculation.

The author discusses the controversy between the upholders of the serum alone method and those of the serum-simultaneous virus or vaccine method of immunization against rinderpest and supports the latter. [It appears that the author has not yet employed the above vaccines for mass use].

J. E.

I. FÄRBER, J. (1931). Ueber das Vorkommen der Dreitagekrankheit in Palästina. [**The Occurrence of Three Day Sickness in Palestine**].—*Berl. tierärztl. Wschr.* **47.** 487-488.

II. BURGGRAAF, H. (1932). " Dreitage-krankheit " op de Oostkust van Sumatra. [**Three Day Sickness on the East Coast of Sumatra**].—*Tijdschr. Diergeneesk.* **59.** 234-237.

I. For some years the author has suspected the existence, in cattle in Palestine, of a disease resembling papataci fever of the human subject. Cases have, however, been too scarce to allow of a full description being given. This year the disease broke out suddenly in epidemic form. It was observed that it occurred after changes in the weather and that it appeared to be associated with the invasion of the shed by flies and other insects. The disease is not contagious. The onset was sudden, the affected animals refused food and were very dull ; the mucous membranes were bright red, there was grinding of the teeth and movements were made with difficulty ; rumination ceased and the pulse was small but strong. The temperature ranged from 41° to 41·8° C. Except for lameness, recovery took place very rapidly.

The author considered the possibility that anaplasmosis was the cause of the trouble, but examination failed to reveal the presence of any ticks, and no parasites could be found in blood smears. There was an increase in the number of leucocytes and particularly of the neutrophiles. Intravenous injection of trypaflavine reduced the temperature, but had no effect upon the other symptoms.

A rough experiment with flies failed to give any result, but the disease was transmitted by blood inoculation to some calves. Twenty-eight to 36 hours after inoculation the temperature rose to from 40·5° to 41·3° C. and the animals were dull. For two days they were unwilling to stand ; by the fourth day the symptoms had passed off and the animals were normal again.

II. The author describes a disease which has been encountered on the east coast of Sumatra and which attacked the estate animals and European dairy cattle. It was characterized by lameness caused by pain in the joints and muscles, an inability or at least a lack of desire to remain standing, very great depression and high fever. In spite of the appearance of very severe illness, recovery takes place very rapidly, although death may result in imported animals.

There is no evidence to indicate that the disease is directly contagious, nor does it appear that ticks play any part in its transmission. It seems possible that mosquitoes are the transmitting agents.

A. LESLIE SHEATHER.

I. REMLINGER, P., PALMOWITCH, S., & BAILLY, J. (1931). Nouveaux faits démontrant que le virus fixe ne passe pas dans le système nerveux central au cours du traitement antirabique. [**New Facts showing that the Fixed Virus does not enter the Central Nervous System during the Anti-Rabies Treatment**].—*C. R. Soc. Biol. Paris.* **107.** 203-204. [2 refs.]

II. REMLINGER, P., PALMOWITCH, S., & BAILLY, J. (1931). La substance nerveuse normale peut-elle rendre les lapins plus sensibles à l'action du virus rabique fixe ? [**Can Normal Nerve Substance render Rabbits more Susceptible to the Action of the Fixed Virus of Rabies ?**].—*Ibid.* 683-685. 1 table. [2 refs.]

I. The brain substance of dogs which had received excessive amounts of fixed virus subcutaneously was inoculated intracerebrally in massive doses into rabbits, with negative results.

II. Reference is made to the work of LOFFLER and SCHWEINBURG, who stated that subcutaneous injections of normal nerve tissue rendered rabbits susceptible to dilutions of rabies virus which were innocuous to controls. Were this true, then it would appear that attempts should be made to minimize the amount of nerve substance inoculated in the course of rabies vaccination. The authors carried out experiments of the same nature, using three viruses, one of which was that used by LOFFLER and SCHWEINBURG. This proved to be highly virulent and, when it was used for testing susceptibility, it was found that rabbits which had been treated with normal nerve tissue beforehand succumbed to a considerably lower dilution of the virus than untreated controls. When two viruses of normal virulence were used no increase in susceptibility was detected.

R. S. ROBERTS.

I. ARAGAO, H. de B. (1931). Sôro-virus vaccinaçao na febre amarella. [**Serum-virus Vaccination against Yellow Fever**].—*Brazil-med.* **45.** 49-51.

II. DAVIS, N. C. (1931). Estudos sobre febre amarella. O effeito do calor e do frio sobre o desenvolvimento da infectividade nos Aedes aegypti. [**Studies on Yellow Fever. The Effects of Temperature upon the Development of Infectivity in** *Aedes aegypti*].—*Ibid.* 77-78. [3 refs.]

III. DAVIS, N. C. (1931). Uso experimental de uma vaccina cloroformada contra a febre amarella. [**Experimental Use of a Chloroformed Vaccine against Yellow Fever**].—*Ibid.* 268-270. [10 refs.]

I. A short discussion of the three methods of immunization against yellow fever. The successful vaccination of five monkeys by the serum-virus method is recorded. The author concludes that this method should be further investigated on account of the simplicity with which it is applied, the virus in the dry form being stable for at least a year.

II. This article is a resumé of the results of a comprehensive series of experiments designed to yield information concerning the effect of temperature upon the development of the virus of yellow fever in mosquitoes. Groups of infective insects were kept at known temperatures for varying periods and allowed to feed on susceptible monkeys.

Insects kept at 8° C. for 28 days were not infective at the end of the period, but after being left at room temperature for 18 hours and at 36° C. for six days they set up fatal yellow fever in a monkey. Six insects which survived exposure to a temperature of 45° C. for two hours and were left at room temperature for 15 days proved infective. Another group submitted to a temperature of 40° C. for seven hours failed to set up fatal yellow fever 17 and 28 days later. The author concludes that there is no attenuation of the virus at low temperatures and that, although some attenuation may occur at high temperatures, the insects themselves are less resistant to the heat than the virus.

III. A description of the mode of preparation of the chloroformed vaccine for yellow fever is given and five experiments designed to throw light upon the failure of this vaccine in actual practice are recorded. It is suggested that the age of the vaccine, the quantity used, or the number of inoculations given might have a bearing upon the question. The results of the experiments indicated that a chloroformed vaccine prepared from the liver substance of animals suffering from yellow fever retained its virulence for at least 28 days when kept at 10° C. 1 c.c. of the vaccine, administered to a monkey, less than three months after its preparation, failed to protect against an experimental infection to which the animal was exposed 40 days later.

R. S. ROBERTS.

FENSTERMACHER, R. (1932). **Studies of Leukemia of Fowls.**—*J. Amer. Vet. Med. Ass.* **80.** 791-799. 3 tables.

The author is studying the role of genetics in the occurrence of leukaemia in fowls. While he states that the number of birds on which reports have been made up till now does not permit conclusions to be drawn, there does appear to be a possibility, from the results he describes, that heredity is a factor to be considered.

Monthly blood examinations have been made on all breeding birds since the investigation was commenced in October, 1928. An intimate blood-picture is drawn, in which the author describes Auer bodies in three cases ; he considers that budding of lymphocytes is indicative of lymphatic leukaemia.

He also describes a condition of aleukaemia, in which birds showing no marked leucocytic changes during life yet showed an enormous enlargement of the liver and spleen on autopsy.

Dealing with the experimental transmission of the disease, he has been able to set up a condition of the blood indicative of progressive mixed leukaemia by inoculating birds intravenously with filtrates or suspensions of the enlarged tissues of a bird hatched from parents from a leukaemic flock. These birds are still under observation.

NORMAN HOLE.

DISEASES, GENERAL.

LEYSHON, W. J. (1932). **A Note on an Ovine Affection.**—*Vet. J.* **88.** 256-259. 4 photomicrographs. [2 refs.]

The affection dealt with is an ovine pneumonia with a loss of condition in the more chronic cases. The outbreak occurred in two lots of sheep introduced and mixed in a London park in May and June, 1929, and was of interest in that there appeared to be evidence of contagion. A mortality of 7·09 per cent. in 493 sheep was sustained.

A detailed account of the outbreak together with a description of the symptoms, morbid anatomy, histology and bacteriology of the disease is given.

Bacteriological investigation was made in five cases which had been obtained within five hours of death and a bipolar, Gram-negative bacillus of the pasteurella type was demonstrated in smears and isolated in cultures from the lung, pleuritic fluid, heart-blood and bronchial lymph glands in all of them. Cultures became sterile after 48 hours at room temperature.

The view is expressed that the extent of the lesions in the lungs was not sufficient to account for death and the theory is put forward that the bipolar organism isolated may be present as a normal non-pathogenic inhabitant and that, in certain conditions, it may become virulent and even cause an infectious disease.

R. S. ROBERTS.

TURNER, H. W. (1932). **Field and Experimental Studies of Sheep Diseases.**—*J. Amer. Vet. Med. Ass.* **80.** 697-710. 3 tables, 2 photographs.

This is mainly a general article dealing with breeding, dentition, medication and the commoner diseases of sheep. The latter part recounts the experimental control of parasitic gastritis in a heavily infested flock of 48 sheep and in their progeny. This was successfully carried out by monthly administration of the commoner anthelmintics, but was equally successful when the animals were fed from specially constructed racks so designed that any food falling from them was

received in a deep trough divided into narrow bays. Excreta was unlikely to find its way into the trough in any quantity, as the bays were too narrow for the sheep to stand sideways in them.

R. S. ROBERTS.

STEWART, W. L. (1932). **Swingback (Ataxia) in Lambs.**—*Vet. J.* **88.** 133-137. 6 figs.

The term " swingback " refers to a disease of lambs most frequently encountered in the north of England and south of Scotland ; it is characterized by a helpless swaying of the hind quarters, which is aggravated by excitement, and invariably ends fatally. There is no suspicion of direct contagion, but the disease appears to be enzootic on certain farms, the annual mortality in lambs ranging from 2 to 10 per cent. Ewes are not suspected of acting as carriers, but it has been noticed that where one of twin lambs is affected the other invariably becomes affected sooner or later. The cases examined by the author have not shown paralysis or loss of sensibility, but rather an incoordination of muscular action.

A pathological examination of two cases was made and degeneration of nerve fibres was noted in the medulla oblongata and in the thoracic region of the spinal cord and there were changes of a necrotic nature in the cells of Clarke's column. The author interprets the changes observed as degeneration of the fibres of the direct cerebellar and ventro-cerebellar tracts and suggests that this and the degenerative changes in the cells of Clarke's column of grey matter would be expected to lead to muscular incoordination.

R. S. ROBERTS.

I. MILLS, R. H. (1932). **Lambing Paralysis.**—*North Amer. Vet.* **13.** No. 8. 28.

II. MILLS, R. H. (1932). **Lambing Paralysis.**—*Vet. Med.* **27.** 186-187.

III. MAGUIRE, L. C. (1932). **Ovine ante- and post-partum Paralysis.**—*Vet. J.* **88.** 148-149.

I. The author states that many cases of " lambing paralysis " have been observed this year [presumably in California]. A discussion follows, in which means of ensuring exercise as a preventive measure are suggested. It is stated that a daily four-mile walk together with a curtailment of rations keeps the disease in abeyance.

II. The same article as I.

III. The author suggests calcium deficiency as the cause of paralysis occurring three weeks before or one week after lambing.

R. S. ROBERTS.

WARRACK, G. H., & DALLING, T. (1932). **So-called " Fowl Paralysis." Also called Neuritis in Chickens, Range Paralysis, Neuro-Lymphomatosis Gallinarum.**—*Vet. J.* **88.** 28-43. [17 refs.]

The authors give an excellent resumé of the literature on fowl paralysis, together with their observations on natural outbreaks and the results of experimental work which they have carried out.

They base the diagnosis of the disease on clinical symptoms, *post-mortem* findings and the histological picture of nervous and other tissues.

Lameness in one or both legs was observed in 78 per cent. of outbreaks; the lameness was progressive and eventually developed into general paralysis accompanied by marked emaciation. Iritis was frequently observed and, although some birds recovered from it, the condition more usually developed into a chronic form, the cornea becoming permanently opaque. The most characteristic lesions were swelling of peripheral nerves and nerve ganglia, especially those of the legs. Soft tumours involving one or other of the internal organs on the skin were considered to be of considerable diagnostic importance. These tumours occurred in the ovary, kidney, liver, pancreas, gizzard, mesentery or intestinal wall. Many of them were composed of the same types of cells as those found in the enlargements of the nervous system.

In the histological examination of brain (cortex), peripheral nerves and tumours, accumulations of cells of lymphocyte, mononuclear and plasma types were regarded as diagnostic of the disease.

The authors discuss the various theories advanced as to the causal agent, such as the relationship to coccidia, intestinal parasites and an ultra-microscopic virus.

In a preliminary transmission experiment with adult fowls, " at least one and probably three " of the six birds inoculated developed the symptoms and lesions of the disease. In a second experiment in which 96 birds from 2 to 2½ months of age were used, 71 were inoculated and 25 kept as controls. Five (7·4 per cent.) of the inoculated birds developed the disease; these positive cases were inoculated with spleen (3), lungs (1) and peripheral nerves (1).

The authors claim to have found considerable circumstantial evidence that infection was transmitted from the adult to the chick *via* the egg.

T. M. DOYLE.

I. Matheson, D. C. (1932). **Observations upon some Prevalent Diseases of Fowls.**—*Vet. J.* **88.** 7-9. [3 refs.]

II. Roe, W. R. (1932). **Poultry Diseases in Cyprus.**—*Ibid.* 122-123.

I. The examination of the birds dying in six high-grade flocks, over a period of one year, revealed that tumours, tuberculosis, impacted crop, impacted oviduct and fatty degeneration of the liver were, in the order mentioned, the most common causes of death.

II. In Cyprus, fowl pox, avian spirochaetosis and fowl cholera appear to be the most important diseases of poultry. Vaccination with pigeon pox virus is being introduced to control fowl pox; tick control measures and intramuscular inoculation of atoxyl are usually effective in spirochaetosis. Fairly satisfactory results have been obtained from the use of a hyperimmune horse serum, prepared on the island, against fowl cholera. Investigations are also being made regarding the value of formolized vaccines against this disease.

NORMAN HOLE.

Edington, G. H., & Cappell, D. F. (1931). **Adenocarcinoma of Undescended Testicle in the Horse: (?) Secondary Growths in Lung and Mediastinum.**—*Proc. Roy. Soc. Med.* **24.** 1139-1140. [2 refs.]

The question of whether non-descent is a causal factor in the occurrence of malignant disease of the testicle has not been conclusively proved. Available figures warrant the belief that malignancy is more frequent in the abnormally placed testis, although this tendency has probably been exaggerated. [Dew. (1925). " Malignant disease of the testicle." pp. 64. London: H. K. Lewis & Co., Ltd.]

A tumour of this type from a six-year-old horse is described. The testis weighed 30 lbs. and was abdominal in position. Growths found in the lungs and mediastinum were considered to be probably metastatic. The primary growth was composed of fibro-fatty tissue containing cellular areas of tumour growth showing necrosis. Epithelial structures observed were considered to be remnants of the rete testis ; the cells exhibited an alveolar arrangement. The growths in the lungs and mediastinum presented the appearance of a columnar-celled carcinoma with a tendency to an adenomatous or papillomatous arrangement.

The testicular tumour showed some resemblance to a seminoma [embryonal carcinoma], but it differed from the pulmonary and mediastinal growths so that its relationship to the latter was uncertain. The occurrence in the human being of tumours of this type is well known. [Little information is available to the comparative oncologist regarding the types of testicular tumours in animals. The occurrence of seminoma in the dog has been recorded by INNES. (1932). *Proc. Roy. Soc. Med.* **25.** 23].

J. R. M. INNES.

FITCH, C. P., BOYD, W. L., ECKLES, C. H., GULLICKSON, T. W., PALMER, L. S., & KENNEDY, Cornelia. (1932). **Report of an Experiment to Determine the Effect of a Low Calcium Ration on Reproduction in Cattle.**—*Cornell Vet.* **22.** 156-172. 8 tables. [14 refs.]

A first report of an experiment conducted jointly by the Divisions of Veterinary Medicine, Dairy Husbandry and Biochemistry of the Experiment Station of the University of Minnesota, the data of which are of special interest in relation to papers already abstracted [see LINTON, this *Bulletin.* **2.** 43 ; THEILER, GREEN, & DU TOIT. *Ibid.* 170 ; ASTON. *Ibid.* 390 ; THEILER, & GREEN. *Ibid.* 391].

The authors carried out their experiment over three years on 20 cows divided into three groups on rations which were low, medium and high in respect to calcium. Expressed as Ca the daily intake was 16·48 g., 31·06 g. and 59·2 g. respectively, the corresponding percentages of the dry matter of the ration being 0·188, 0·357 and 0·658 respectively. The phosphorus intake was comparatively constant, varying from 26·76 to 30·16 g. per day, expressed as P, with corresponding percentages of 0·285 to 0·316.

The number of recorded lactations in each group was 16, 12 and 13, and the milk yield 7,336, 6,449 and 7,389 lbs. per lactation.

In general all three groups behaved in much the same way and the low calcium did not result in lessened breeding efficiency, nor did it affect the quantity or composition of the milk. The low calcium of the ration was not reflected by lowered blood calcium and balance trials conducted at intervals throughout the experiment indicated marked ability of the animals to adjust themselves to the calcium at disposal and to conserve the quantity ingested when this was limited. Although the cows on so little as 16 g. Ca per day showed small negative balances at the height of lactation (3 gallons), equilibrium was restored by the time the yield had fallen to about a gallon per day.

[These results are of exceptional interest in view of the wide differences in prevailing ideas of the calcium requirements of cows and the alleged calcium deficiencies of pastures in various parts of the world.

The figure 16 g. Ca for normal reproduction and lactation up to 7,336 lbs. should be compared with the figure of about 6 g. Ca (8·2 g. CaO) for normal growths of heifers recorded in the earlier experiments of THEILER, GREEN and DU TOIT. (1927). Minimum Mineral Requirements of Cattle.—*J. Agric. Sci.* **17.** 305. In those experiments this exceedingly low calcium intake sufficed until calving

(without material change of blood calcium) although various complications ensued thereafter.

In the discussion following LINTON's paper (this *Bulletin*. **2.** 44.) Stewart assessed the daily requirements of a four-gallon cow at 70 g. Ca and mentioned certain Northumberland hill pastures as only supplying about 32 g., or below KELLNER's standard for even a one-gallon cow. The animals of the Minnesota workers may be treated as 2½ gallon cows which remained normal on 16 g. Ca, or only half the computed intake from the English pastures suspected of deficiency.

In regard to percentage calcium in a ration the 1921 data of HART and associates of Wisconsin treated 0·45 per cent. Ca on the dry matter of the total ration as desirable for herbivora. In 1930 REED and HUFFMAN of Michigan reported satisfactory results with 0·28 per cent. Minnesota workers now report normal reproduction and lactation at only 0·19 per cent.

This downward movement of opinion regarding minimum calcium requirements means that caution should be exercised in deducing calcium deficiency in herbivora from comparative data on pasture analyses, and rather supports the view of THEILER (this *Bulletin*. **1.** 313.) that an acalcicosis is never likely to be encountered amongst grazing cattle].

H. H. GREEN.

DISEASES CAUSED BY METAZOAN PARASITES.

TAYLOR, E. L. (1932). **Fascioliasis Warning.**—*Vet. Rec.* **12.** 213-215.

The acute and subacute forms of the disease in which the bile ducts are not thickened and the liver is enlarged and hyperaemic may at times escape diagnosis. Slicing the liver, squeezing it in a bowl of water and then washing the sediment is recommended as a good method of finding the young flukes in these cases.

The discovery of carbon tetrachloride is regarded as one of the most valuable contributions which veterinary science has made in recent years to the safeguarding of animal husbandry.

E. L. TAYLOR.

I. CAMERON, T. W. M. (1931). **On Two New Species of Nematodes from the Scottish Red Deer.**—*J. Helminthol.* **9.** 213-216. 6 figs. [1 ref.]

II. CHITWOOD, B. G. (1932). **A New Species of Hookworm from a Philippine Civet.**—*Philippine J. Sci.* **47.** 259-261. 5 figs. on 1 plate, 1 key. [2 refs.]

III. ROSS, I. Clunies. (1931). **The Small Lung Worm of Sheep in New South Wales.**—*J. Sci. & Indust. Res. Australia.* **4.** 254-255. [2 refs.]

I. The first of these two new species was found in the connective tissue between the latissimus dorsi and the external intercostal muscles of two red deer, *Cervus elaphus*; it belongs to the metastrongylidae, but differs from the known genera so is placed in a new one. The name proposed is *Elaphostrongylus cervi*.

The second new species has been found in considerable numbers in the abomasum and duodenum of this host on a number of occasions. This species is tentatively placed in the genus *Ostertagia* and is named *O. cervi*; it differs from all other members of the genus except *O. harrisi* in that the posterior ovarian tubule is atrophied.

II. A new species, named by the author *Uncinaria philippinensis*, has been found in the small intestines of a Philippine civet, *Paradoxurus philippinensis*, which died in the Zoological Park, Washington, D.C. The species is described and a key given to assist in its differentiation from the other three members of the genus.

III. It has been assumed in Australia, as in other parts of the world, that *Protostrongylus rufescens* is the common lung worm of sheep. A male worm was recovered from an infected animal from New South Wales and found on examination to belong to the species *Muellerius capillaris*. In the past this species has doubtless been mistaken for *P. rufescens*.

E. L. TAYLOR.

MORGAN, D. O. (1931). **Some Observations on Experimental Ascariasis in Pigs.**—*J. Helminthol.* **9.** 121-128. 1 graph. [4 refs.]

This paper gives an account of some miscellaneous observations made in an attempt to produce ascariasis in pigs by experimental feeding of the embryonated eggs. One pig which received doses of the embryonated eggs of *Parascaris equorum* at the ages of two months, three months and five months, did not show any results. Embryonated eggs of *Ascaris lumbricoides* of the pig were given to three two months old pigs, also with negative results : a larger dose was given to these pigs when five months old and as a result all three died within six days.

Larvae from the lungs and liver of one of these were fed to three other five months old pigs. All of them already harboured a slight natural infestation, but a sudden rise in the egg count showed that, in two of them at least, some of the experimentally administered worms had succeeded in establishing themselves in the bowel.

A large number of embryonated eggs were given to one ten months old pig with the result that it died nine days later.

Egg counts made on the faeces of the three five months old pigs which received the larvae collected from the lungs and liver indicated that the worms do not persist for long ; one pig had entirely lost its infestation in 18 weeks and at the end of 22 weeks only two worms were carried by each of the other two pigs.

There appeared to be no connection between the gain in weight of those three pigs and the intensity of infestation as shown by the egg counts.

E. L. TAYLOR.

BLACKIE, W. K. (1931). **Observations on the Immunity Response in Experimental Ascariasis in Rabbits.**—*J. Helminthol.* **9.** 91-96. 1 graph. [5 refs.]

The complement fixation test has given positive results in several kinds of helminthic infestation where the parasites are in intimate contact with the tissues. An account is here given of complement fixation tests carried out on two rabbits after the administration of a large dose of the infective eggs of *Ascaris megalocephala*, the larvae of which in migrating through the lung might be expected to give rise to the formation of antibodies.

The conflicting results which have been obtained in the application of the complement fixation test to helminthiases may possibly be due to the complex nature of the antigen prepared from whole worms and it is not improbable that antigen prepared from one tissue would given more constant results. The antigen used in these tests was therefore prepared from the gravid uteri of *A. megalocephala*, and was an alcoholic extract of the powdered material.

After the feeding of the two test animals, the complement fixation test was carried out at intervals over a period of five weeks and showed a rise in antibody content of the serum up to the 14th day and a gradual fall from the 18th day to the end of the experimental period, thereby showing that the migrating larvae of *A. megalocephala* call forth a definite immunity response in the rabbit.

E. L. TAYLOR.

OFFICIAL REPORTS.

CANADA. (1931). **Report of the Veterinary Director General, Health of Animals Branch, Department of Agriculture, for the Year ending March 31, 1931.** [HILTON, G.] pp. 76. Ottawa : F. A. Acland. [8vo].

Dr. Hilton, upon whom the distinction of honorary Associate, Royal College of Veterinary Surgeons, was conferred on the occasion of the last International Veterinary Congress in London, gives his own account of the work of the whole department. The detailed reports of the Contagious Diseases Division [CAMERON, A. E.], the Meat and Canned Foods Division [BARNES, R.] and of the Pathological Division [WATSON, E. A.] which constitute parts of the whole report are dealt with separately in this *Bulletin* [pp. 621, 622, and 617].

The description of the extensive work of the progressive department controlled by Dr. Hilton makes interesting reading. The account in the first few paragraphs of the success attained in the eradication or approaching eradication of certain of the big animal scourges still causing heavy losses in many countries will fill colleagues in other parts of the world with envy as well as with admiration for the results achieved.

" Dourine of horses and sheep scab have been eradicated, anthrax is practically unknown, while cattle mange, which in the past required the maintenance of numerous swimming vats for the treatment of thousands of affected and contact animals, is now limited to a few small outbreaks amenable to individual hand treatment."

Outbreaks of glanders are of rare occurrence. The compensation paid for hogs slaughtered in the course of the hog cholera work was, with the exception of that paid in 1927-1928, the lowest on record for 26 years.

The eradication of rabies gives trouble, chiefly on account of the failure of local authorities to enforce suitable laws for the control of stray dogs during the long periods when there is no infection.

Bovine haematuria, which causes considerable loss in British Columbia, is being actively investigated. Equine pernicious anaemia was not as prevalent as usual in the Prairie Provinces during the summer : a similar disease, possibly due to a different filtrable virus, is under observation in Northern Ontario and the Ottawa valley.

The development of the fur farming industry is producing its own problems, some of which are new. Parasitic infestations and a disease similar to canine distemper are important causes of loss.

Br. abortus infection is given great attention. Control measures which are optional to the owner, based on sanitation and blood testing, are giving good results ; the number of herds under control is rising and the demand for negative reactors is increasing.

" I am glad to state that no undue difficulty has been experienced in controlling and eliminating this infection on our experimental farms. This infection has been eradicated in practically all of these herds and a clean status maintained."

The campaigns for the control of tuberculosis are being pushed forward energetically. Public interest in the work and support of the department continues to increase. Approximately 1,400,000 cattle are now under supervision and it is estimated that 600,000 cattle will have to be retested at least once during the ensuing year under the " restricted area " scheme. Dr. Hilton hopes that provincial governments will soon agree to take over the testing of cattle in areas located in their respective provinces, in which the department has reduced the infection to one half of 1 per cent. or less, and that they will assume responsibility for maintaining the areas free so that his departmental officers may be released for work in new areas.

The " accredited herd plan " of eradication continues to be popular, but the condition that each herd must contain at least ten registered cattle of one breed, six of which are over six months of age and one of them a herd sire not less than a year old, the registered cattle to comprise at least one third of the entire herd, limits the extent to which owners can enrol.

The " supervised herd plan " is available for those herds which cannot qualify under the " accredited herd plan " ; in this plan no compensation is paid for cattle slaughtered as the result of positive tuberculin tests.

Exporters of cream to the United States have to meet specific requirements which the department controls. Under these regulations, 3,500 producers supply milk to 45 plants through which the export trade is organized.

55,000 store cattle were exported to Great Britain in 135 shipments.

Constant vigilance is exercised to prevent the introduction of foot and mouth disease. A new order was introduced during the year, replacing an existing order, under which importation of meat is prohibited from all countries in which foot and mouth disease has been known to exist during the twelve months immediately preceding. Under another new order, all untanned hides and skins originating in infected countries must be forwarded to the tannery for disinfection in sealed cars.

" It further prohibits the importation of bones, hoofs, horns, fleshings, hide cuttings, parings, and raw animal products from infected countries, while consignments originating in other countries may only be imported for disinfection on approved premises.

" No changes have been made in the orders prohibiting the importation of manure and fertilizers containing animal products, bone meal and foodstuffs containing animal matter, and second-hand or previously used bags and bagging, nor in the restrictive orders governing the importation of merchandise packed in products of the soil, and grains and mill feeds for live stock feeding, except that New Zealand, Australia, Union of South Africa, Irish Free State, Northern Ireland and Japan were exempted from the provisions of the latter order on February 21.

" The discharging of manure, garbage and refuse in Canadian ports or waters, from ships sailing from other countries is still prohibited, except that in case special adequate provision is made by the steamship company to remove these materials in suitable tight containers, for immediate incineration, permission to do so under official supervision is granted.

" The bringing into any port in this Dominion of ruminants and swine for any purpose, including those carried as ' ship's stores,' except, and unless they are covered by your [Minister of Agriculture] permit, is prohibited under departmental order of September 28, 1929."

An order prohibiting the importation of parrots and certain closely related birds on account of the danger of psittacosis infection was in force from May 10th to November 13th.

Dr. Hilton closes his report with a general review of the main departments into which the Health of Animals Branch is divided and with an interesting general account of his official visit to Europe in 1930 for the International Veterinary Congress and other purposes, in the course of which he travelled widely and met many of those responsible for administration, research, etc., in the different countries.

W. A. P.

CANADA. (1931). **Report of the Pathological Division, Health of Animals Branch, Department of Agriculture.** [WATSON, E. A.] *Rep. Vet. Direct. Gen. Health Anim. Branch, Dept. Agric. 1931.* pp. 49-76. Ottawa : F. A. Acland. [8vo].

This is a report to the Veterinary Director General and it includes the following papers :—Avian Tuberculosis in Cattle, by C. A. MITCHELL, pp. 61-62 ; Repeated Intradermal Tuberculin Tests of Cattle with Necropsy Findings, by

C. W. McIntosh, pp. 62-65 ; Studies on the Control and Elimination of Bovine Infectious Abortion, by C. A. Mitchell, pp. 66-70 ; Research on Swamp Fever or Infectious Equine Anaemia, by L. M. Heath, pp. 70-71 ; Records of Insects affecting Wild Life in B.C., by E. A. Bruce, pp. 71-73 ; Infectious Bronchitis of Fowls (Laryngotracheitis), by C. H. Weaver, pp. 74-75 ; and *Dermacentor albipictus* as a Parasite of Moose and Cattle in Nova Scotia, by P. J. G. Plummer, p. 76, all which will be dealt with separately in this *Bulletin*.

It includes summaries of the work performed at the other laboratories, under the charge of the Chief Animal Pathologist, the laboratories at Lethbridge, Alberta [Heath, L. M., Pathologist in Charge], at Agassiz, British Columbia [Bruce, E. A., Pathologist in Charge] and the Poultry Diseases Laboratory, Central Experimental Farm, Ottawa [Weaver, C. H., Pathologist in Charge], the work at the latter being carried out in co-operation with the Poultry Division.

The work of the department is extending rapidly and the staff available is hardly sufficient to cope with it.

The Animal Diseases Research Institute, Hull, Quebec, established a few years ago as the research centre and headquarters for disease investigation, is thoroughly well equipped, but the scientific staff is only enough to form a nucleus of the personnel and organization required. More workers are required for bacteriological and biochemical subjects. Dr. Watson emphasizes the importance of expanding such a well-found institute and the need to give greater attention to public health questions, rather than to limit the activities to those merely relating to animal diseases.

" Routine Laboratory Services.—These services are concerned mainly with the diagnosis of infection, diseases and pathological conditions. They include blood and serum tests for infectious bovine abortion or Bang's disease, pullorum disease in poultry, dourine, etc. ; bacteriological and pathological examinations for tuberculosis, rabies, anthrax, blackleg, haemorrhagic septicaemia, etc. ; parasitic infestations ; tumours ; meat and canned food products ; water analyses, etc.

" During the year 22,755 specimens and samples in the above categories were received at the laboratory as compared with 14,734 during the previous year.

Biological Products.—" Tuberculin : All of the tuberculin used for diagnostic purposes in the campaign for the control and eradication of bovine tuberculosis has been manufactured at the Animal Diseases Research Institute. Every demand has been met and the total issue of this product amounts to over 2,000,000 test doses.

" Mallein : Over 5,000 doses of Mallein have been prepared and issued, as required, for the diagnostic test of glanders in horses.

" Johnin : Johne's disease or paratuberculous enteritis of cattle appears to be on the increase according to the reports coming in. To assist in the herd or field diagnosis of this disease the manufacture of Johnin has been commenced and is being issued to inspectors and veterinarians.

" Serums and Vaccines : These products are prepared for experimental purposes only and are tried in connection with special research problems under study. They include ' BCG vaccine ' for experimental immunization against tuberculosis, and biological preparations for immunizing against swamp fever of horses, infectious mastitis of cattle, etc."

Tuberculosis. Vaccination with BCG.—Work has been in progress since 1924, and the general world position, together with the experiments carried out at the institute are discussed. The need for a great deal more research on the subject is emphasized. Dr. Watson has found that the strain does not remain avirulent in inoculated animals and that such animals are therefore a source of danger.

" The degree of safety and efficacy of BCG vaccination, the possible advantages and disadvantages, risk and danger, and its proper evaluation, have not been determined. It is clearly not beyond the experimental stage and its further study and trial should be on a definitely experimental basis. In human tuberculous families in which infants are exposed to heavy infection from birth, it is conceivable that artificial infection with BCG would involve a lesser risk than the unavoidable virulent human infection and may be beneficial in increasing

resistance during the first few critical months of life. No such expediency however arises in connection with new born calves in this country where the incidence of tuberculosis is low, and where marked progress is being made in eliminating sources of infection and maintaining cattle herds and large areas free from bovine tuberculosis."

Avian Tuberculosis.—The work in progress has indicated the danger to animals of other species from tuberculous birds. " Tuberculous infection of avian origin is not only a destructive disease in poultry but is an important factor in tuberculosis of swine and other animals, and in sensitizing animals to the tuberculin diagnostic test."

Diagnostic Methods.—The biochemistry of tuberculins is being studied. Tests of the reactions of naturally infected animals carried out over long periods have shown that at different stages of the infection there is considerable variation in the reactions.

The Blood Picture in Tuberculosis.—An elaborate study is in progress of the changing blood picture in the course of tuberculous infection and of the changes taking place in tuberculous or sensitized animals immediately following the administration of tuberculin. This work will soon be published.

" No Visible Lesions " in Tuberculin-Reacting Cattle.—Such reactions are recorded in something less than 10 per cent. of the examinations carried out. Many of the animals on which such a record is made were doubtless recently infected or were tolerant at that stage to the infection. " Our laboratory investigations in connection with such cases go to show that in some, at least, intermediary types of tubercle bacilli, possibly of avian origin, and of relatively low virulence and pathogenicity for cattle, are responsible for the infection or sensitization and the reaction following the tuberculin tests."

Bovine Contagious Abortion.—The institute is closely associated with the eradication schemes.

" Diagnostic services are rendered free of charge to owners who sign a special agreemen and who undertake to adopt and carry out the measures recommended for the elimination of infection and the building up of clean herds. Indiscriminate testing is discouraged for it can hardly serve any useful purpose and, in fact, may do harm as a means of assisting owners to get rid of infected animals in undesirable ways, resulting in the further dissemination of the disease. Testing should carry with it a definite plan of control and follow-up work, and proper safeguards in regard to the disposition of reacting animals. The most frequent source of infection and reinfection is the reacting animal known as the relatively immune or resistant ' carrier ' which may never abort, raise healthy calves, yet continuously harbours virulent infection and periodically excretes it from its udder.

" The investigational work undertaken includes studies of the channels of infection and natural ways of transmission from animal to animal ; experimental infection, and the udder as the chief colony and reservoir of Brucella abortus infection ; serum diagnosis and practical control measures."

Bovine Mastitis.—The extent to which the disease causes loss in Canada is mentioned : work on the subject is being developed.

Diseases of Horses Caused by Filtrable Viruses.—Equine pernicious anaemia (swamp fever) has been the subject of considerable investigation in Canada. It occurs in the western part of the country. A disease of horses which is possibly closely allied to swamp fever has been studied recently in the eastern part of Ontario and the western part of Quebec. It is also caused by a filtrable virus and is manifested by febrile conditions analogous to swamp fever. Comparative studies of both viruses are in progress.

Bovine Haematuria.—This is considered to be probably a nutritional or deficiency disease. It occurs in British Columbia and a plan is under consideration for an affected farm to be leased so that a study of the various factors believed to be concerned in causing the condition may be undertaken in collaboration with the Experimental Farms Branch of the Department of Agriculture.

Diseases of Poultry.—Parasitic infestation, cannibalism, *Bact. pullorum* infection, peritonitis, vitamin deficiency, tuberculosis, fowl paralysis and infectious bronchitis are the causes of the heaviest poultry losses in Canada.

Diseases of Fur Bearing Animals.—The development of the fur-farming industry has extended the sphere of the veterinary department in Canada. Parasitic infestation and distemper are important in relation to disease.

Branch Laboratories.

Research Station, Lethbridge, Alberta. [Heath, L. M., Pathologist-in-Charge].—Routine diagnosis of specimens has become so heavy that additional laboratory assistance has had to be provided. Tuberculosis and equine pernicious anaemia (swamp fever) have been studied.

The immunizing properties of certain fractions of the tubercle bacillus have been investigated. Tests have been made of the bactericidal properties and effects of rock lime and hydrated lime on tubercle bacilli.

" Stiff disease " of lambs is prevalent in certain districts in Alberta. It may not have any relationship to the condition that goes under the same name in Montana (U.S.A.). The disease is under investigation : in one affected flock the condition was only present in the male castrated lambs. An acid fast bacillus was isolated from one case.

" Experiments have been made with certain filtrable bacillary products obtained from the growth of *Br. abortus*, and a determination of the therapeutic value of these products is now under study.

" Experimental infection of laboratory animals with *Brucella abortus* has been readily effected by rubbing a suspension of the living organisms on the skin, but a similar experiment made on a single cow was not successful. Nevertheless, it is quite possible that cattle do become infected through the skin."

Research Station, Agassiz, British Columbia. [Bruce, E. A., Pathologist-in-Charge].—The laboratory building is beyond repair and new accommodation is required. Routine examination of material sent for diagnosis is a heavy item.

The blood of 227 British Columbia and 5,221 Alberta hogs was tested for *Br. abortus* infection. All were negative except nine and these could only be classed as suspicious.

In viability experiments made with *Br. abortus* on soil, hay and sawdust, positive results were obtained on the 113th day with all three materials and on the 158th with two strains kept on soil.

Two cases of tularaemia were reported in the province during the year, one in a snowshoe rabbit and one in a man ; the man was said to have been bitten by a deer fly.

Mention is made of an unusually severe outbreak of tick paralysis in cattle, observations on parasites, the successful use of an autogenous vaccine for an outbreak of infectious enteritis in swine, work on bovine haematuria, work on ticks and tick-borne diseases and of losses of cattle attributed to smelter fumes.

Poultry Diseases Laboratory, Central Experimental Farm, Ottawa, Ontario. [Weaver, C. H., Pathologist-in-Charge].—Routine examination of material sent for diagnosis is undertaken.

" Routine laboratory services deal with the receipt and examination of 1,884 specimens and the diagnosis of twenty classified diseases and pathological conditions.

" Special studies made or in progress include the following :—

" Mortality, its incidence and causes among different classes of fowl.

" Intestinal parasitism and the conditions under which it becomes a menace and produces heavy losses, and of methods of control and prevention.

" Pullorum disease in relation to chick mortality and its control through blood testing of the adult fowls.

" Infectious bronchitis."

W. A. P.

CANADA. (1931). **Report of the Contagious Diseases Division, Health of Animals Branch, Department of Agriculture.** [CAMERON, A. E.] *Rep. Vet. Direct. Gen. Health Anim. Branch Dept. Agric. 1931.* pp. 20-41. Ottawa : F. A. Acland. [8vo].

This is a report to the Veterinary Director General. No serious outbreaks occurred in the Dominion during the year ; a large number of the veterinary inspectorate staff were, in consequence, available for the tuberculin testing of cattle.

Anthrax has never been prevalent in Canada : three outbreaks involving 12 deaths occurred in Ontario. There have been no cases of dourine for 11 years. There were two outbreaks of glanders, both in the province of Quebec. Hog cholera only broke out in two provinces—2 outbreaks in Quebec in which 73 pigs were destroyed and 3 in Ontario in which 110 pigs were destroyed. Cattle mange occurred in Manitoba (11 affected and 664 quarantined for treatment), Saskatchewan (21 affected and 962 quarantined in three outbreaks) and Alberta (5 affected and 988 quarantined in two outbreaks). " All cattle disposed of from infected herds are traced and the whole herd into which the cattle are introduced is treated unless the addition was made more than six months previously and no symptoms are evident."

There were four outbreaks of horse mange (New Brunswick, Manitoba and Alberta) ; ten horses showed clinical symptoms and 68 were treated. No case of sheep scab has occurred for three years.

Rabies is being brought under control and less than half the cases dealt with in the previous year were reported. Forty-three cases were confirmed (24 dogs, one horse, 11 cattle, 4 sheep, 2 pigs and one cat). They were all in the provinces of Quebec and Ontario. The department is now much more satisfied with the position with regard to the disease.

TUBERCULOSIS.

ACCREDITED HERD PLAN.—There are 5,122 fully accredited herds, 1,039 herds undergoing accreditation and 167 herds awaiting test. When accredited herds are included within a restricted area many owners have preferred that their herd should come under the area plan rather than continue as an individual herd under the accredited herd plan.

216,580 tests were carried out ; 2,868 reactors were found and $182,910 were paid in compensation.

SUPERVISED HERD PLAN.—This is devised for those herds which cannot qualify for the accredited herd plan. The eradication methods used are practically the same for both plans, but under this plan no compensation is paid for the slaughter of the reactors, although slaughter is compulsory. 1,910 herds are enrolled and 622 await testing. 26,637 cattle were tested and 810 reactors were found.

MUNICIPAL TUBERCULOSIS ORDER.—No new herds have been accepted under this order for seven years. The number of herds will be gradually reduced when the localities in which they are situated are brought under the " area " plan (below). The order applies to 25 municipalities ; 80,262 tests were made and 659 reactors were slaughtered at a compensation of $23,888.

RESTRICTED AREAS FOR THE ERADICATION OF BOVINE TUBERCULOSIS.—

" Large numbers of cattle have been tested in new areas and these together with the retests necessary to maintain the areas have involved the testing of approximately half a million cattle during the past year.

" Under the Restricted Area Plan all cattle in a specified area are tested, the reactors are slaughtered under supervision and compensation is paid. All cattle for permanent

stay in an area, except those for immediate slaughter, must be accompanied by an official certificate of tuberculin test."

574,395 tests were made on 501,171 cattle : 33,350 reactors (6·7 per cent.—lowest 0·2 per cent. and highest 29·5 per cent.) were found ; 32,937 cattle valued at $1,743,550 were destroyed and $1,162,366 were paid as compensation.

INFECTION WITH *Brucella abortus*.—Assistance in the control of this disease is being given in 66 herds, 21 of which belong to experimental farms.

EXPORT OF MILK AND CREAM TO THE UNITED STATES.—To comply with the United States Import Milk Act, premises and cattle of owners exporting milk and cream have to be inspected. Permits are granted to 33 shipping plants and 12 collecting stations supplied by 3,500 "patrons."

INSPECTION OF STOCK CARS AND YARDS.—Stock car inspectors are maintained at 31 railway centres and all stock cars passing through these points are cleaned and disinfected under supervision unless they show evidence of having already been dealt with. 73,612 cars were dealt with.

All stock yards in the Dominion are also cleansed and disinfected and maintained in a sanitary condition.

W. A. P.

CANADA. (1931). **Report of the Meat and Canned Foods Division, Health of Animals Branch, Department of Agriculture.** [BARNES, R.] *Rep. Vet. Direct. Gen. Health Anim. Branch, Dept. Agric. 1931.* pp. 41-48. Ottawa : F. A. Acland. [8vo].

The work of the department is growing as the population and livestock increases. The department has been in existence for 23½ years : its function is to provide " a safe meat food supply, thereby protecting and prolonging human life by eliminating all danger of infection by the consumption of contaminated or diseased meat."

The number of animals slaughtered in the packing houses during the year was rather less than usual.

" Business conditions generally have a marked effect upon packing house operations. Unemployment and a decrease in earning power has resulted in a decreased demand and a consequent lowering of prices for the live animal and also the finished product.

" The sale of meats on our foreign markets has been very unsatisfactory, resulting in a sharp drop in prices paid to the producers. While this is somewhat discouraging, the price of feeds has been similarly reduced. Therefore, the net profit to the feeder has been little changed. It would appear that the low level has been reached and that a more optimistic outlook for the future is warranted."

There is a steady advance in the sanitary control of the commercial establishments inspected. The number of plants operating under inspection increased by six. The department gives assistance in connection with the plans for new establishments and also with regard to the operation of plants which are to be placed under inspection.

Addresses are given on the activities of the department to interested bodies.

Two Orders in Council amending meat regulations are included in the report.

A list is given of the 66 meat packing establishments in operation under the Meat and Canned Foods Act.

The total number of animals slaughtered was :—cattle, 991,048—a decrease of 12 per cent. over the previous year ; sheep, 774,675—an increase of 1 per cent. and swine, 1,868,657—a decrease of 16 per cent.

Tables show various aspects of the work—the percentage of slaughter for

each province to the total of all Canada, diseases found at establishments under inspection for the fiscal year and other items.

W. A. P.

NEW SOUTH WALES. (1931). **Live Stock Diseases Report (No. 6) Department of Agriculture, Recording Control Work during the Year ended 30th June, 1930.** [HENRY, M.] pp. 18. Sydney: Alfred James Kent. [8vo].

ACCOMMODATION AT HEADQUARTERS.—In common with the rest of the Department of Agriculture, the Stock Branch moved into its new quarters during the latter part of the year.

The two outstanding features for the year from the disease standpoint have been the initiation of a campaign against the wound infections of sheep, and the development of the work in connection with the diseases of poultry.

The report of the Glenfield Veterinary Research Station [SEDDON, H. R.] which is part of the Department of Agriculture is dealt with separately [see p. 625].

CATTLE DISEASES.

CONTAGIOUS BOVINE PLEURO-PNEUMONIA.—In comparison with previous years, the incidence of the disease was light.

"The District Veterinary Officer (West) was in the remarkable position of being able to report his area free for the whole period. When this is compared with the outbreaks for the preceding two years, which were: 1927-28, forty-five and 1928-29, twenty-three, it will be seen what excellent work has been carried out. It could, of course, only have been brought about under the drought conditions which prevailed, and the cessation of the introduction of cattle from Queensland."

Delay in reporting the disease gives considerable trouble to the department. The complement fixation test was used officially for the first time in the State for diagnosis. There were 102 outbreaks involving 11,256 cattle and 335 cattle died or were destroyed. The deaths and destructions were higher than usual in proportion because in one serious outbreak the situation was complicated by poverty and exposure to rigorous weather.

A figure is given with graphs showing the numbers of stock introduced into New South Wales from Queensland and Victoria and the outbreaks of the disease during the years 1918-1930.

ANTHRAX.—18 outbreaks occurred involving cattle, sheep and pigs.

TUBERCULOSIS.—Under the tubercle-free herd scheme, 5,022 head of cattle were tested, of which 87 reacted (1·73 per cent.). Those tested for the first time numbered 2,066, of which 70 reacted (3·39 per cent.).

The operations of the Swine Compensation Act have provided an excellent means of tracing the presence of tuberculosis on infected farms.

CONTAGIOUS MAMMITIS.—Milk samples are sent to the Glenfield Veterinary Research Station. The use of vaccines prepared helped to minimize the spread of the disease. The department recommends suitable vaccination.

CONTAGIOUS ABORTION.—There has been a very considerable increase in the amount of work carried out in connection with this disease. Eradication is in progress in many herds.

PIROPLASMOSIS.—No outbreaks were recorded.

CATTLE TICK CONTROL.—The report of the Chairman, Board of Tick Control, an officer of the department [O'GORMAN, C. L.] is given.

The work increased greatly during the year and increased staff was obtained. The treatment of affected cattle is in accordance with the policy laid down by the Federal Tick Commission, the details of which are discussed.

The winter was much more severe than usual. It was hoped that the frosts and general hard conditions would materially assist the eradication campaign, but the ticks did not appear to have been adversely affected. The spring was warm with good rains and was favourable to ticks.

There were 690 infestations during the year, 106 being new ones.

Sheep Diseases.

Anthrax.—In the West, drought conditions appear to have played a part in lessening the number of outbreaks as in the past; the District Veterinary Officer considers that the absence of a particular grass seed of the hard pointed type which readily penetrates the skin of sheep, and so causes serious trouble, has been a responsible factor.

Wound Infections.—The conditions leading to caseous lymphadenitis are discussed. After the Australian investigations had been completed, the assistance of the Graziers Association was sought and, with the assistance of the press, detailed general recommendations were made known widely to the public. These consisted of advice concerning cleanliness, disinfection, etc., in dealing with marking, castrating and docking lambs, shearing, and in all operations involving the gathering of sheep in which cutaneous injury might result. They also included advice as to culling infected sheep.

Blackleg.—There were 63 outbreaks.

Lice and Ked Infestation.—The extent to which it was necessary to quarantine sheep on account of lice and ked infestation fell off. Throughout the year no sheep were allowed to be sold at any saleyards in the West if found to be infested. Dealers who operate extensively are refusing to handle infested sheep. The general tightening up all round has had the desired effect of keeping infested sheep out of the saleyards and forcing owners to dip their sheep.

Infestations with the foot or leg louse (*Linognathus pedalis*) have been reported rather more frequently than usual.

Blowfly.—Mr. Henry is Chairman of the Departmental Committee on Blowfly and the officers of the department are associated with the investigations being carried on under the control of Dr. Seddon. The farm at Nyngan, carrying about 1,200 sheep is specially devoted to this work and a veterinary officer is stationed there.

Parasitic Infestation caused a good deal of trouble during the year, the use of the copper sulphate and mustard drench has become more widespread and favourable reports are being received from stock owners. Mortality from the use of carbon tetrachloride is reported at times. The results are, however, so good that these occurrences do not really affect its use.

Mortality from Dietetic Causes.—The department is fully alive to the importance of this aspect of disease. Toxaemia of pregnancy in ewes occurred under drought feeding conditions. The types of feed most frequently found at fault were an extensive ration of such feeds as oats or one of the brands of proprietary nuts. Advanced fatty degeneration of the liver was commonly seen in extremely poor sheep. The exercise factor was considered to be of very great importance. Owners usually feed their sheep once a day, and on the same feeding ground with the result that the sheep acquire feeding habits and travel very little. On account of the cost of transport and convenience, the feed supply is frequently concentrates only.

Swine Diseases.

As reported under the heading Cattle Diseases, anthrax occurred in swine. No cases of swine fever were reported. Under the Swine Compensation Act £22,222 was spent in retrospective claims arising out of the outbreak of swine

fever [see this *Bulletin* **2.** 326]. £20,000 was paid in compensation for 5,536 pigs condemned after slaughter. Details of the districts of origin and of the conditions found in the pigs are given.

W. A. P.

NEW SOUTH WALES. (1931). **Veterinary Research Report No. 6. Parts I and II, Department of Agriculture (June, 1931).** [SEDDON, H. R.] pp. 91. Sydney: Alfred James Kent. [8vo].

The report consists of a brief account of the work of the Glenfield Research Station (pp. 3-10) and the following papers as scientific appendices, two of which have already been dealt with separately in this *Bulletin*:—Infectious Pneumonia of Sheep, by W. L. HINDMARSH, T. T. MCGRATH and H. G. BELSCHNER, pp. 11-21; Studies in Infectious Ophthalmia of Sheep, by G. EDGAR, pp. 22-35 [see this *Bulletin*. **2.** 160.]; Some Observations on the Treatment of Young Sheep for "Lungworm" (*Dictyocaulus filaria*) Infestation by Intratracheal Injections, by T. T. MCGRATH, pp. 36-39 [see this *Bulletin*. **2.** 156.]; Observations upon the Conditions requisite for the Transmission of Gastro-Intestinal Nematodes of the Sheep, by H. R. SEDDON and T. T. MCGRATH, pp. 40-57; Arsenical Poisoning in Stock from the Ingestion of Vegetation sprayed with Arsenic, by A. A. RAMSAY and H. R. SEDDON, pp. 58-69; Poisoning of Sheep by the Seeds of Burrawang (*Macrozamia spiralis*), by H. R. SEDDON, H. G. BELSCHNER and R. O. C. KING, pp. 70-80; Sterility in Dairy Cattle in New South Wales. A Summary of the Present Position, by W. L. HINDMARSH, pp. 81-90. The papers which have not already appeared will be abstracted in this *Bulletin*.

Additional laboratory accommodation and staff have been provided since the issue of the last report to cope with the increased demands of the station. An officer specializing in avian pathology [HUTCHISON, J. K.] has been appointed to the staff.

The new laboratory wing covers approximately 2,000 sq. ft. and consists of three laboratories, a chemical room, media preparation room, media storage room, diagnostic room, etc. and accommodation for animals.

A subsidy of £1,250 per annum for veterinary research has been provided by the Pastures Protection Board of New South Wales and allocated to the station. A McGarvie Smith research scholar works at the station and the services of Mr. C. R. MULHEARN were provided for part of the year by the Council for Scientific and Industrial Research.

DIAGNOSTIC WORK.—This work is very heavy, amounting to 8,369 items.

RESEARCH WORK.—Work on a number of problems was brought to a stage at which a report could be issued, some of them being included in that now under consideration.

No less than 26 different items of investigation are discussed and they cover a very wide field from pure bacteriology to pasture improvement.

SHEEP DISEASES.—Individual susceptibility has been found to be an important factor in cutaneous myiasis. Carbon tetrachloride is used as the routine treatment for liver flukes with good results, but, as elsewhere, the treatment causes losses in odd flocks; the cause of these losses is being investigated. Further work has been done on the mould previously described as responsible for mycotic dermatitis (lumpy wool) and the mould has now been cultivated. Two forms of arthritis in lambs and young sheep—a non-suppurative specific infection and a non-specific type associated with pyogenic organisms—have been under observation. An organism similar to *B. pyogenes* appears to be responsible for the specific type.

" Swelled head " is a serious disease of young Merino rams, but the incidence is low. The cause is still obscure. Toxaemic jaundice (" yellows ") occurs as two distinct types of disease which are being studied. Ophthalmia in sheep (" pink eye ") has been shown to be infectious, but the cause has not yet been determined. After recovery, affected eyes have developed local immunity.

Pigmentation of wool was found to be due to *B. pyocyaneus* alone (yellow pigmentations) or in association with an acid-producing organism (red colourations). Infectious pneumonia due to the pneumo-bacillus was investigated.

Cattle Diseases.—A close study of the effect of vaccination on streptococcic mammitis and the factors concerned has been made in two herds. Temporary sterility has been found often to be associated with inflammatory conditions of the vagina.

The work on contagious abortion was chiefly related to diagnosis, but tests are carried out in connection with the establishment and maintenance of herds free from the disease. Bovine haematuria is enzootic in certain coastal areas of New South Wales. Observations made so far indicate that in these areas the disease is associated with certain natural bush ; botanical surveys have been made and certain types of vegetation are being tested.

Pig Diseases.—Septicaemia in pigs leading to condemnation at the abattoir was found to be due to *Bact. suipestifer*. Pyobacillosis and ulcerative granuloma have been studied.

Miscellaneous.—Work is in progress on internal parasites. Fowl pox vaccination is being tested experimentally. The control of *Bact. pullorum* infection is encouraged with the assistance of the laboratory. A fatal disease of kangaroos was found to be due to streptothricosis and a vaccine was used with success.

As in previous years, poisonous plants have been studied. Plants tested and found to be toxic include *Nicotiana glauca*, *Pimelea pauciflora*, *Macrozamia spiralis* and *M. Perowskiana*.

The influence of pasture improvement measures on the health of sheep is being followed, particularly with regard to the influence on gastro-intestinal parasitism.

Hand-feeding of Sheep.—

" The sheep on Nyngan Experiment Farm have been set apart as a flock for the investigation of sheep diseases. This property is light carrying country of low rainfall and subject to drought. The question of hand-feeding during drought period is, therefore, an important one. . . ."

The investigation is still in progress.

W. A. P.

Government of India. (1931). **Annual Report of the Imperial Institute of Veterinary Research, Muktesar. For the year ending 31st March, 1931.** [Ware, F.] pp. 51. Calcutta : Government of India Central Publication Branch. [8vo]. [2s. 9d.]

This report consists of three parts :—(1) the report of the Director ; (2) the report of the Veterinary Research Officer, Muktesar [Cooper, H.] and (3) the report of the temporary Deputy Director, Imperial Veterinary Serum Institute, Izatnagar [D'Costa, J.].

Staff.—A list is given of the staff at Muktesar and at Izatnagar.

Production.—An explanation is given of the table in Appendix A which shows the quantities of serum produced during the year. There was a falling off in the demand for anti-rinderpest serum and anti-haemorrhagic septicaemia serum ;

rinderpest is declining at present in most parts of the country, but the smaller demand for other products was undoubtedly due to the shortage of money in most provinces. It is hoped that the prices of some of the products may be reduced in the future as they are now too high. A report is given of improvements in the manufacture of some of the products.

INSTRUCTION.—A list is given of 13 officers who took post-graduate and refresher courses at the institute.

FINANCE.—The expenditure of the two institutes is shown separately in Appendix V, but it is explained that the difference shown on paper does not represent the real difference between expenditure on research and on production, as several products are still made at Muktesar and the Izatnagar products are tested at Muktesar.

REPORT OF THE VETERINARY RESEARCH OFFICER, MUKTESAR.

Owing to the amount of work undertaken at the institute, a proposal was submitted to the Government, and has now been approved, to split up the technical work at Muktesar into three sections, Pathology, Serology and Protozoology.

RINDERPEST.—A detailed report is given of the year's work on rinderpest research. It was considered that the serum-simultaneous method of inoculation is safer than the vaccine method due to the very limited time during which the vaccine is both safe and protective.

Experiments carried out indicated that in natural conditions rinderpest only spreads very slowly to in-contact cattle. This is very important as the main arguments of those who favour serum-alone inoculation for rinderpest is that, in the course of an outbreak, the cattle pick up a natural infection promiscuously while protected by the serum.

The Director, Civil Veterinary Department, Bengal, had suggested that, as the cattle in that province so usually undergo mild reactions when inoculated with goat virus, it might be justifiable to use smaller doses of serum or virus alone for the production of immunity. In experiments carried out, it was found that in average plains cattle the dose of serum used in simultaneous inoculation can be considerably reduced.

Details are given of the results of experiments in curative chemotherapy.

FOOT AND MOUTH DISEASE, ANTHRAX, BLACKQUARTER, HAEMORRHAGIC SEPTICAEMIA AND PNEUMONIA.—Research work was carried out on each of these diseases. As regards blackquarter, it will be possible to make further progress when a whole-time bacteriologist is working at the laboratory.

JOHNE'S DISEASE.—An infected herd has been established and observations will be made over a number of years and should be most valuable. A report is given on different methods of diagnosis ; testing with avian tuberculin made at Muktesar proved the most reliable method.

BOVINE PIROPLASMOSIS.—Details are given of the result of drug treatment experiments. Plasmoquine appeared to be of value in acute *Theileria mutans* infection when used on certain imported bulls, but in tests on chronic infections at Muktesar there did not appear to be any specific action. Neither asuntol nor trypaflavine were of value in acute infection. On the other hand, trypaflavine is said to have had an immediate and undoubtedly specific curative action in preliminary trials in *Babesia bigemina* infection and to be distinctly superior to trypan blue. It is not, however, free from toxic action on cattle.

Although acute theileriasis broke out at Muktesar during the years 1922 and 1923, not a single further case occurred for seven years, although careful routine examinations were made. There was one case in 1930.

BOVINE NASAL GRANULOMA.—It was considered that treatment with tartar

emetic was most efficacious, but that the high cost involved in the repeated injections necessary would prevent its use in the control of the disease in India. Further experiments are being carried out.

Other Bovine Diseases.—Work on contagious abortion, streptococcic mammitis, chronic haematuria, surra in buffaloes and parasitic infestation is described.

Sheep and Goat Diseases.—Owing to shortage of staff it has not been possible to do as much work on this subject as it was hoped. Caseous lymphadenitis, abortion in goats and other conditions were dealt with.

Equine Diseases.—Reports are given on experimental treatment of strangles and paddock fever ; the production of high potency mallein was investigated and work on equine contagious abortion and on piroplasmosis was continued.

Canine Diseases.—Some experiments were carried out on piroplasmosis, canine typhus and on spleen extract treatment for eczema.

Fowl Diseases.—Newcastle disease occurred in Bengal in 1928-1929. The work on the disease was continued. Indian green parakeets and crows were found to be susceptible. An outbreak of fowl typhoid on a privately owned farm was investigated ; the existence of this disease had not previously been reported in India.

Entomology.—A report is given of the work done in this section during the year.

Routine Examinations.—Full details are shown under this heading.

Miscellaneous Conditions.—A spirochaetal infection in guinea pigs was studied. It was obtained from guinea pigs on which *Ornithodorus crossi* had been allowed to feed at Lahore.

Eight specimens of leeches collected on animals and man in Muktesar were sent for identification and found to be *Dinobdella ferox* Blanchard.

Report of the Deputy Director, Imperial Veterinary Serum Institute, Izatnagar.

Reports are given under the headings :—(1) supplies ; (2) labour ; (3) cultivation ; (4) construction and (5) production.

Details are also given of the experiments and tests made in collaboration with the Muktesar staff.

Appendices.

The six appendices show in detail the quantities of serum produced, the quantities issued, the results of inoculations made, specimen received and examined and a financial statement.

W. A. P.

Tanganyika Territory. (1931). **Annual Report of the Department of Veterinary Science and Animal Husbandry, 1930.** [McCall, F. J.] pp. 60. Dar es Salaam : Government printer. [fcp.] [5s.]

Staff.—The European staff consists of 20 veterinary officers, one chief clerk, two assistant livestock officers, one laboratory assistant, 24 stock inspectors, one farm manager, one clerk storekeeper and one mechanic. In addition, there is an Asiatic staff of six together with 250 African quarantine guards.

The report of the Veterinary Pathologist which is included in that of the Director of Veterinary Services is dealt with separately in this *Bulletin* [see p. 630].

TOURING.—The members of the European staff travelled 24,487 miles on foot and 75,040 miles by motor vehicles.

The report is divided into four sections :—(1) General and Staff ; (2) Disease Control ; (3) Report of the work of the Veterinary Laboratory, Mpwapwa, and (4) Animal Husbandry.

DISEASE CONTROL.

RINDERPEST.—The policy of the department to eradicate rinderpest by quarantine and serum-alone inoculation appears to be meeting with success. There has been a reduction in the number of outbreaks and it is of equal importance that the number of animals in quarantine was reduced from 240,000 to 52,000. Although rinderpest is no longer interfering with the economic progress of the Territory, it remains a perpetual menace and is likely to be as long as it is present within or near the frontiers.

TRYPANOSOMIASIS.—The problem of the extent to which trypanosomiasis is set up by flies other than tsetse is discussed and instances are given in which the disease has been demonstrated in cattle kept under close observation in areas free of tsetse. It is pointed out, however, that the cyclically transmitted disease is the great problem and that the control of tsetse remains the crux of the situation.

EAST COAST FEVER.—The losses from this disease are believed to be greater than those from all other causes combined. During the period under review the losses were less than usual, probably on account of a good grazing season, which reduced the overcrowding that takes place during dry seasons on the banks of rivers, etc. In connection with the control of East Coast fever by dipping the Veterinary Pathologist says :

> " A most important point in connection with dipping is that it must not destroy the enzooticity of east coast fever ; all calves must continue to contract the disease, *i.e.*, until such time as dipping becomes universal. Actually, so heavily tick-infested is the whole country that even animals which have been dipped regularly for years have still many *Rhipicephalus* ticks in the ears and under the tail, so I do not think that weekly dipping unaccompanied by hand-dressing of ears, will ever endanger this natural immunisation of calves, and the practice of dipping may therefore be thoroughly recommended. Nevertheless, under the circumstances, coercion is not justified, and I told Mr. Cartmell to recommend, but not to insist on, dipping. I also told him that calves should preferably not be dipped until they have been through their first attack of east coast fever. I instructed him, however, to insist that herds be either dipped regularly or not at all, so that we shall be able to get definite information by comparing the dipped and undipped ones. The value of dipping is even now sufficiently obvious to the trained observer to justify Government leaving off supplying dipping fluid free ; in future native authorities should buy their own."

CONTAGIOUS BOVINE PLEURO-PNEUMONIA.—This disease is confined to Masailand where there are a small number of infected areas. It made its appearance on two European-owned farms and all in-contact cattle were inoculated with glycerinated lymph with a mortality following inoculation of about 1 per cent.

TUBERCULOSIS.—It was formerly considered that the freedom of Zebu cattle from tuberculosis was the direct result of the open air life, but the interesting view is now put forward that these cattle enjoy specific immunity.

SNOTSIEKTE.—An outbreak of this disease caused heavy mortality in two herds of cattle, while four other herds in adjoining kraals remained healthy. It is suggested by the Masai that cattle contract infection by grazing over ground on which brindled gnu have calved.

MISCELLANEOUS.—Blackquarter, cutaneous streptothricosis, ephemeral fever, cow pox and plant poisoning are dealt with.

The report discusses the possibility that heartwater exists in the territory ; work on the subject is in progress. Sections of the report deal briefly with diseases

of goats, sheep and pigs. In connection with pig diseases the report mentions one recorded outbreak of swine fever. A point of great interest is the occurrence of that " extraordinary form of porcine trypanosomiasis which flares up and dies down with such rapidity that so far it has defeated the efforts of all investigators to put an undisputed name to the causal trypanosome."

Under the head Diseases of Equines, the remark is " there is nothing to report."

In the section Animal Husbandry, the live stock census and danger from overstocking are discussed at length.

The hide and skin industry is dealt with at considerable length. Mr. HOOD, a member of the veterinary staff, was placed for some months on special duty to enquire into the question and arrangements are now made to instruct those concerned in the best methods to be followed.

T. M. DOYLE.

TANGANYIKA TERRITORY. (1931). **Report on the Work of the Veterinary Laboratory, Mpwapwa.** [HORNBY, H. E.] *Ann. Rep. Dept. Vet. Sci. & Anim. Husb. 1930.* pp. 14-51. Dar es Salaam. Government printer. [fcp.]

In addition to the general account of the work carried out during the year, there are the following special reports on the research work done :— (1) Rinderpest Research, by R. L. CORNELL and S. A. EVANS ; (2) A Note on Piroplasmosis, by the same authors ; (3) Research on Trypanosomiasis, by H. E. HORNBY and H. W. BAILEY ; (4) A Note on Goat Scab, by W. H. BAIRD ; (5) Remarks on Stomoxys in Connection with Mechanical Transmission of Trypanosomes, and (6) Notes on Stock Feeding, by H. E. HORNBY. Numbers 1 and 3 will be dealt with separately in this *Bulletin.*

RINDERPEST RESEARCH.—Trials of antiseptics, other than those in routine use, for the preservation of anti-rinderpest serum were carried out. Carbolized saline (0·5 per cent.) was found to be effective and inexpensive and has been adopted as the routine method.

Various small modifications were introduced in the routine preparation of serum and have helped towards the preparation of a better product.

Experiments on anti-rinderpest vaccine were continued.

RESEARCH ON TRYPANOSOMIASIS.—In last year's report it was mentioned that blood smears taken early in the morning were more strongly positive for *T. congolense* than smears taken at midday. It has since been proved that the reduction is caused by temperature and not by light.

TREATMENT.—

" In last year's report much space was given to a description of experiments in connection with antimony therapy, and general recommendations as to treatment of bovine trypanosomiasis were framed. Owing to the decision of the manufacturers to standardise veterinary ' Antimosan ' as a 6·3 per cent. solution of a combination of trivalent antimony with sodium pyrocatechin disulphonate, the wording of these recommendations as to treatment should now be modified slightly to read as under :

" Treatment should be commenced as early as possible in the course of infection and should consist of the subcutaneous administration in front of the shoulder of five doses of ' Antimosan,' with a week's interval between the doses. Each dose should consist of 40 c.c. for an average-sized native ox, *i.e.*, one weighing about four cwt. Thick smears of the patient's blood should be examined weekly thereafter. If relapse occurs, the course of injections and its subsequent blood examinations should be repeated. A second relapse should be followed by a third course, but a third relapse calls for an increase in dose. The beast should be given one double dose, *i.e.*, 80 c.c., and this should be repeated if or whenever trypanosomes reappear. While undergoing medicinal treatment the animal must be well-fed, but, provided he is neither anaemic nor emaciated, he can be worked moderately hard."

" It is certain, then, that most cases of bovine trypanosomiasis are now amenable to

treatment with 'Antimosan,' and the drug is bound to play an important part wherever high-priced stock are exposed to danger of trypanosomiasis. The qualification is made because the drug itself is high-priced (from 1s. 3d. to 2s. 6d. per dose according to amount ordered and whether the drug is issued in bottles or in phials). It is unlikely that this price can be reduced; 'Antimosan' is practically non-irritant because it is a solution which is of optimum tonicity and hydrogen ion concentration for rapid absorption, and this needs much skill in preparation and dispensing. When the salt was issued to us in tablet form and we dissolved it ourselves before injection we got immensely inferior results in respect of rate of absorption and consequent irritation of subcutaneous tissue.

"This rate of absorption can be gauged by the time taken for trypanosomes to disappear; with home-made solutions the time was two to four hours, whereas with 'Antimosan' it is about ninety minutes. After injection of home-made solutions severe swellings were the rule; with 'Antimosan' they are the rare exception. Owing to the application of 'Antimosan' therapy being limited by price it is necessary that the old-fashioned tartar emetic treatment be still employed where native animals are concerned. We employ it in exactly the same way as we recommend for 'Antimosan,' using 25 c.c. of a 4 per cent. aqueous solution of tartar emetic instead of 40 c.c. of 'Antimosan,' and of course, give the injections intravenously.

"Since both salts depend on trivalent antimony for their trypanocidal action one might expect recognisable similarity in curves of disappearance of trypanosomes from the peripheral blood stream. Consequently, we failed to understand why after an injection of 'Antimosan' there should be a great temporary increase in the concentration of trypanosomes in the peripheral circulation and yet no similar increase had been reported in connection with tartar emetic. The explanation, we discovered, is that the increase does occur, but it had apparently escaped observation on account of the rapidity of the rise. Only if smears are taken at very short intervals is the rise apparent. This is shown if we compare the curves following (a) subcutaneous injection of 'Antimosan'; (*b*) intravenous injection of 4 per cent. solution of tartar emetic. In the one the crest is twenty minutes after injection; in the other, five."

PATHOLOGY.—

"In last year's report (page 37) a statement appeared to the effect that 'it is becoming more and more obvious that as definite distinctions must be drawn between the diseases due respectively to *T. brucei*, *T. congolense* and *T. vivax* as between the parasites themselves.' We are now inclined to go further and say that not only must distinctions be drawn between the disease due to different species of trypanosomes but the distinctions must extend to host differences as well. We mean that *Trypanosoma brucei* disease of horses may not only differ markedly from *T. congolense* disease of horses but may differ from *T. brucei* disease of, say, cattle.

"For several years we have maintained a strain of a polymorphic trypanosome which is extremely virulent in its action on small laboratory animals and on goats. We consider it to be *T. brucei*, though as it was isolated from a cow which had passed through a known sleeping-sickness area it may possibly be so-called *T. rhodesiense*. The course of the disease produced by this trypanosome in rats and guinea-pigs is characterised by rapid multiplication of the parasites within the blood, and the beast dies when the infection is swarming. On the other hand, rabbits and goats are not killed so rapidly; in them trypanosomes remain rare in the blood-stream, but changes in other tissues are much more apparent than they are in rats and guinea-pigs. For example, eye lesions have not been noticeable in infected rats and guinea-pigs, whereas conjunctivitis and keratitis have been frequently observed in rabbits and goats. In addition, in rabbits, there has generally been ulcerative rhinitis, and the condition of these animals has become so miserable that for pity's sake we rarely used them and always destroyed them when symptoms became pronounced. In another year's report we may give details of the various changes found in different hosts, but for the present we merely wish to point out that syndromes vary with different species of hosts as well as with different species of parasites."

PIROPLASMOSIS.—An interesting observation was that cattle immune to piroplasmosis (*Babesia bigemina*) need not necessarily be "carriers."

GOAT SCAB.—It has been shown that when goats affected with sarcoptic mange are dressed with a mixture of oil, sulphur and tar they recover completely and do not carry a latent infection. An attack of the disease does not, however, confer any resistance to re-infestation with parasites, but the skin does not appear to be affected to the same extent as it does with a first attack of the disease.

SHEEP NOSTRIL FLY.—Observations were carried out on the life history

of the fly, *Oestrus ovis*. The larvae were found to require a minimum of seven and a maximum of ten months for their development.

THE RELATION OF STOMOXYS TO MECHANICAL TRANSMISSION OF TRYPANOSOMES.—Flies were allowed to feed on infected guinea pigs infected with *T. brucei* and preparations from the proboscis and contents of the ventriculus were then examined, one minute after feeding in the case of the former material and up to 15 minutes in the case of the latter. Trypanosomes were never found in the proboscis and large numbers of apparently active trypanosomes were always present in the ventriculus.

" The conclusion from these and last year's observations is that blood passes rapidly and completely through the proboscis, and that there is no regurgitation on resumption of feeding after a break."

NOTES ON STOCK FEEDING.—About 350 species of common plants were collected by HORNBY and identified by GREENWAY, the Botanist at Amani.

T. M. DOYLE.

NORTHERN RHODESIA. (1931). **Annual Report, Department of Animal Health, for the Year 1930.** [SMITH, J.] pp. 30. Livingstone: Government Printer. [fcp.]

The report of the Veterinary Research Officer is included in this publication, but is dealt with separately in this *Bulletin* [see p. 633].

The general agricultural conditions under which work was performed by the department were much the same as in the previous year; there was progress in the education of native stock owners in improved methods of stock raising. The number of dipping tanks was increased and natives have begun to show more interest in their use; they now consult the dipping inspectors about animal ailments, a distinct result of the earlier work of the department and an achievement in that it puts the natives in closer touch with the veterinary staff.

A system of government loans for the purpose of assisting European farmers to carry out necessary structural improvements on their farms was instituted.

The pig and sheep industries have made much headway and should expand greatly.

The section of the report dealing with diseases is by the Deputy Director of Animal Health [MORRIS, J. P. A.]. Contagious bovine pleuro-pneumonia remained localized and anthrax was well under control, chiefly by the use of prophylactic vaccination; blackleg was reported frequently, but did not cause heavy losses; cases of supposed breakdown in immunity following vaccination against the disease were believed to be due to malignant oedema infection which was first diagnosed in Northern Rhodesia during the year.

Contagious abortion is enzootic but is not of great economic importance. Losses in sheep previously suspected to be due to plant poisoning were finally diagnosed as heartwater and this is now controlled by dipping. Senkobo scab (streptothricosis) was successfully countered by regular dipping. Ephemeral fever (three day sickness) was higher in incidence than usual; two cases of horse sickness were observed. Fourteen outbreaks of rabies occurred, 8 more than in 1929; in one case the infection was traced to a jackal bite. Tuberculosis in cattle is believed to be extensive in the Fort Jameson district and the Director draws attention to its importance in relation to human health.

Two cases of tropical piroplasmosis were observed in two pedigree bovines exported from South Africa: there was some fear that they might be cases of East Coast fever but no Koch's bodies could be demonstrated. Anaplasmosis

and piroplasmosis were prevalent in various parts of the territory, but losses are not severe if reasonable care is taken and suitable dipping is resorted to.

Under the heading of trypanosomiasis the progress in control of tsetse flies is discussed. The fly has receded from human-occupied areas in recent years due to the institution of modern control measures. Large numbers of tsetse flies which are attracted to moving motor vehicles, are killed by insecticide sprays in "smudge houses" erected along the Great East Road in the Fort Jameson district. Losses in cattle near Livingstone were diagnosed as trypanosomiasis (species not named) and investigation was still in progress.

OUTBREAKS OF SPECIFIC DISEASES DURING THE YEAR ENDING 31ST DECEMBER, 1930.

Disease	Living-stone	Barotse	Choma	Maza-buka	Luan-gwa	Fort Jame-son	Aber-corn	Total
Anthrax	—	—	1	1	4	—	—	6
Quarter Evil... ...	1	—	14	19	16	—	—	50
Contagious Abortion*	—	—	2	—	—	—	—	2
Trypanosomiasis* ...	1	—	—	—	—	48	—	49
Anaplasmosis ...	4	—	—	2	10	—	—	16
Piroplasmosis ...	—	—	—	—	1	—	—	1
Heartwater	—	—	1	—	5	—	—	6
Horse Sickness ...	—	—	—	2	—	—	—	2
Pleuro-pneumonia† ...	—	—	—	—	—	—	—	—
Tuberculosis ...	—	—	—	—	—	3	—	3
Actinomycosis ...	—	—	—	—	—	—	—	—
Bacillary Necrosis ...	—	—	—	—	—	—	—	—
Follicular Mange‡ ...	2	—	8	7	4	—	7	28
Senkobo Skin Disease‡	2	—	8	19	4	—	—	33
White Scour ...	—	—	1	—	—	—	—	1
Ephemeral Fever**...	—	—	—	—	—	—	—	—
Specific Ophthalmia**	6	—	5	—	—	—	—	11
Sweating Sickness**	—	—	—	—	—	—	—	—
Rabies	1	—	8	3	2	—	—	14
Vegetable Poisoning	1	—	4	2	—	2	—	9
Glanders	—	—	—	—	—	—	—	—
Acute Dysentery ...	1	—	2	—	—	—	—	3
Ringworm	—	—	1	—	—	—	—	1
Totals ...	19	—	55	55	46	53	7	235

*Endemic in parts. †Confined to Barotseland ; Endemic.
‡Prevalent in parts in native-owned herds. **Seasonal occurrences.

Two quarantine areas—at Maramba at the southern border and at Kazangula opposite Bechuanaland—are maintained for the purpose of preventing the entrance of contagious diseases. The management of these areas is described.

The report terminates with statistics relating to census returns and diseases of animals.

J. E.

NORTHERN RHODESIA. (1931). **Annual Report of the Veterinary Research Officer for 1930.** [MACDONALD, R. A. S.] *Ann. Rep. Dept. Anim. Health, 1930.* pp. 17-24. Livingstone : Government Printer. [fcp.]

This report covers the second year of operation of the research station ;

research into ten diseases was undertaken. Mr. P. L. LE ROUX was appointed Assistant Veterinary Research Officer.

SENKOBO SKIN DISEASE.—A streptothrix is always demonstrable under the scabs of the skin lesions and has been isolated in pure culture, the characteristics of which are described in a brief appendicular note. All attempts to transmit the disease either by direct administration of the organisms by various routes or by tick transmission have yielded negative results. Methods of treatment are still under investigation.

VEGETABLE POISONING.—This is a common condition and headway in the classification of the plants concerned is being made. Four species have so far been implicated—*Senecio latifolius*, a plant similar to *Moraea Stricta* Baker, *Urginea altissima* and *U. Burkei* Baker. A descriptive pamphlet on poisonous plants is in course of preparation.

A botanical classification of plants found near the research station is being conducted with the assistance of the Division of Plant Industry of the Union of South Africa. A list of identified plants is given in an appendix.

In order to facilitate the diagnosis of deaths due to cyanogenetic glucosides from ingested plants, two bovines were killed by dosing with Scheele's solution of hydrocyanic acid and the *post-mortem* appearances, which were carefully studied, are described.

PSEUDO-URTICARIA OF CATTLE.—This condition, not previously described in Northern Rhodesia, occurred in 1929-1930 and an account of it is given. All cattle on low lying grazing in two separate districts were affected. The lesions took the form of nodular lumps which appeared on any part of the body. Preliminary work suggested that a biting insect is the cause and it is stated that similar lesions can be produced by intradermal injections of formic or acetic acid.

RABIES.—Wild carnivora were shown to act as a reservoir for the virus. Examination of the brains of three out of four jackals yielded a positive result.

TRYPANOSOMIASIS.—Two affected bovines were placed under observation and their peripheral blood was examined daily for a long period. The parasite was considered to be *T. vivax*.

MISCELLANEOUS.—Work was done on lob-knee disease in cattle [presumably], posterior paralysis of cattle, horse sickness, *Theileria mutans* infection and tick pyaemia of horses, but is incomplete as yet.

The report closes with a memorandum on inoculation against redwater and gall sickness and with an account of experiments on animal nutrition.

J. E.

NORTHERN RHODESIA. (1932). **Annual Bulletin, Department of Animal Health 1931.** pp. 47. Livingstone : Government printer. [4to]. [2s. 6d.]

This is a new publication designed to present various aspects of the work carried out by the Department of Animal Health, Northern Rhodesia in a form in which it will be of value to agriculturists in that territory. "The articles have been shorn, to the greatest extent possible, of technical phraseology and every effort made to present the necessary details in a form which will be understood by all."

The contents of the brochure are as follows :—General Review of the Cattle Industry [Northern Rhodesia], by J. SMITH, pp. 4-8 ; Notes on the More Important Worms of Cattle, Sheep and Pigs in Northern Rhodesia, by P. L. LE ROUX,

pp. 9-24 ; Trypanosomiasis, by G. F. ELLIOTT, pp. 25-28 ; Plant Poisoning in Cattle and Sheep in Northern Rhodesia, by R. A. S. MACDONALD, and P. L. LE ROUX, pp. 29-37 ; Observations on Block Tests Performed on Northern Rhodesia Cattle at the Central Research Station, Mazabuka, June, 1931, by R. A. S. MACDONALD and P. L. LE ROUX, pp. 38-39 ; Heartwater, by E. H. BROGAN, pp. 40-42 ; Inoculation against Redwater and Gallsickness, by R. A. S. MACDONALD and P. L. LE ROUX, pp. 43-44 and Notes on the Conservation and Feeding of Pedigree Stock, by R. A. S. MACDONALD and P. L. LE ROUX, pp. 45-47. Some of these articles will be dealt with separately in this *Bulletin*.

The stockowner in Northern Rhodesia and in other territories will undoubtedly find these articles of great value.

W. A. P.

BOOK REVIEW.

GAIGER, S. H. [F.R.C.V.S., Professor of Animal Pathology, University of Liverpool] & DAVIES, G. O. [M.V.Sc., M.R.C.V.S., D.V.H., Lecturer in Animal Pathology, University of Liverpool]. (1932). **Veterinary Pathology and Bacteriology**. pp. vii+610. 193 figs. London : Baillière, Tindall & Cox. [8vo]. [25s.]

In the preface the authors point out that in Pathology and related subjects the requirements of the English speaking student of Veterinary Science have been insufficiently provided for, and that it has been their object to produce within handy compass a text book that will meet his needs. They say, with justice, that they hope the book will be of value to workers in a much wider field.

The system followed is first to describe general pathological processes, and then to give a detailed account of the specific causal agents of disease, leaving the special pathology of the body systems to be dealt with last as, by this arrangement, the text of the earlier chapters serves as an introduction to the final sections. The book is divided into 38 chapters—5 (84 pp.) on general pathology, 24 (316 pp.) on specific causal agents of disease and 9 (140 pp.) on the pathology of the body systems. The last 34 pages contain an appendix devoted to technique. It will at once be apparent that the authors have exercised great discrimination in covering such a wide variety of subjects within such a convenient volume.

The numerous illustrations are one of the important features of the book. Most of them are original and they reflect the care taken in the selection of preparations which show the salient features of the conditions described ; many of them are unique in their excellence and even where there are so many the appetite of the reader is whetted for more.

In the bacteriological section, BERGEY'S classification has been followed. The accounts of the various micro-organisms and of the disease conditions with which they are associated are sound, lucid and up-to-date. The more important subjects are given their full share of space and those of lesser importance are given sufficient attention for the purposes of the general work. The necessary linkages with human pathology have been given due attention throughout the book.

As would be expected, Professor Gaiger's work in India and South America, as well as his extensive research and teaching experience in this country, have contributed to the general balance and strength of the book.

As is desirable in a text book primarily designed for students, the teaching is dogmatic and clear. Where knowledge is still imperfect this is clearly stated.

There is an excellent index. The publishers' share in production has been

well executed ; the paper is of good quality, the print is clear and the cover is neat.

The authors are to be congratulated on their book and can claim that they have justified the aims set out in the preface. It will be a blessing to students and practitioners ; public health officers will keep it handy on their book shelves and field officers and others in all climates will find a place for it in a corner of their travelling kit.

W. A. P.